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TRW/ENVIRONMENTAL ENGINEERING DIV REDONDO BEACH CA  
RELIABILITY AND MAINTENANCE PROGRAM ANALYSIS RELIABILITY AND MA--ETC(U)  
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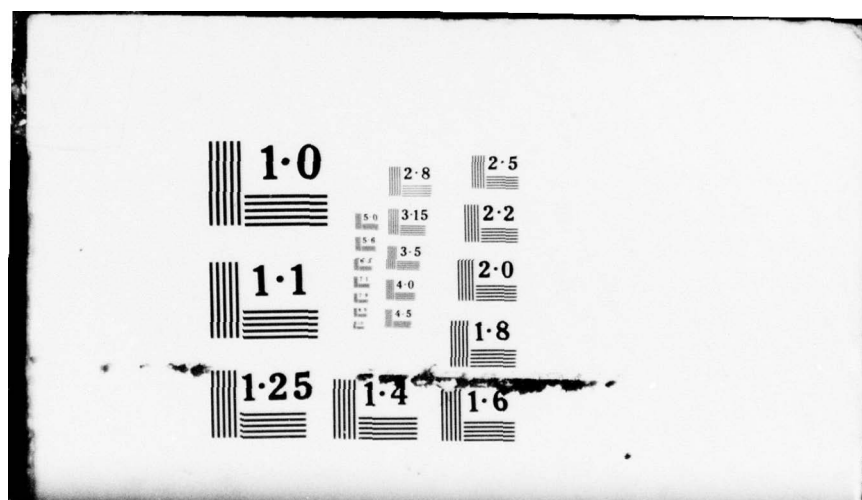
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This volume contains background data used to generate the results and conclusions of Volume I (CAMDS Maintenance Resource Assessment). 410979		

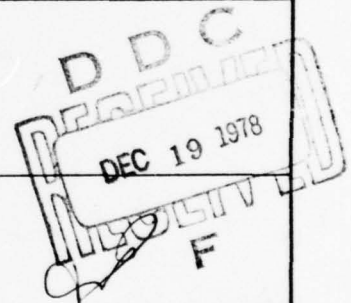
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(19) DRCPM-DRD-CR-76009-VOL-2 (18) DRCPM-DR

6 **RELIABILITY AND MAINTENANCE  
PROGRAM ANALYSIS**

**RELIABILITY AND MAINTAINABILITY ALLOCATIONS  
ASSESSMENTS ANALYSIS REPORT**

FOR

**CAMDS**

**FINAL REPORT  
VOLUME II**

1 Final rept.

Submitted to  
TOOELE ARMY DEPOT  
Tooele, Utah 84074

1062 356

11 23 APR 23 1976

12 307p

Prepared under  
Contract No. DAAG-49-75-C-0135

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**TRW** ENVIRONMENTAL  
ENGINEERING  
DIVISION

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## VOLUME II — ADDENDUM

Contained within this addendum volume are the following items of essentially background data used to generate the results and conclusions of Volume I:

- o A summary of the results (failure rates, MTBF, Maintainability, MTTR, and Availability) for each Munition for a given Building Block.
- o Supplemental Data sheet(s) indicating the source of the description of equipment used (e.g., drawings), and the failure rate and maintainability data sources.
- o A flow chart of the subsystems of each Building Block used in the analysis. This flow chart merely identifies the subsystem considered, and is not necessarily a functional or logic diagram.
- o Equipment Information and Failure/Maintainability Data sheets. These are the fundamental working level raw data sheets used to generate the sum total failure rate and Maintainability final data.

The above items are grouped together by Building Block and are listed in the order of Building Block number.

Inasmuch as this volume basically contains working level information, no further attempt was made to make this a formal data package.

THE VIEWS, OPINIONS AND CONCLUSIONS  
CONTAINED HEREIN ARE NOT TO BE  
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# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #1 UNPACK AREA (UPA)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA TM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	NEG	N/A	NEG	N/A	21.0
Rocket, 115mm, M55	VX	Comp B	M28	NEG	N/A	NEG	N/A	21.0
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	NEG	N/A	NEG	N/A	21.0
Projectile, 155mm, M121A1	GB	None	None	241.039	4149	584.843	2.43	.999
Projectile, 155mm, M121	GB	None	None	241.039	4149	584.843	2.43	.999
Projectile, 155mm, M122	GB	None	None	241.039	4149	584.843	2.43	.999
Projectile, 8", M426	GB	None	None	153.506	6514	371.790	3.42	.999
Projectile, 155mm, M121A1	VX	None	None	241.039	4149	584.843	2.43	.999
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	NEG	N/A	NEG	N/A	21.0
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	241.039	4149	584.843	2.43	.999
Projectile, 155mm, M104	HD	Tetrytol	None	241.039	4149	584.843	2.43	.999
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	NEG	N/A	NEG	N/A	21.0
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	NEG	N/A	NEG	N/A	21.0
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	NEG	N/A	NEG	N/A	21.0

\*MUNITION DEMILITARIZATION PROCESS FLOW

8 2 12 12 227

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #1 UNPACK AREA (UPA)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL ABIL
*BULK ITEMS,GB/VX								
Bomb,750#,MQ-1	GB	None	None	N/A	N/A	N/A	N/A	N/A
Tank,Spray, TMU-28/B	VX	None	None	N/A	N/A	N/A	N/A	N/A
Ton Container	GB	None	None	N/A	N/A	N/A	N/A	N/A
Tone Container	VX	None	None	N/A	N/A	N/A	N/A	N/A
*TON CONTAINER,MUSTARD								
Ton Container	HD	None	None	N/A	N/A	N/A	N/A	N/A

SUPPLEMENTAL DATA

BUILDING BLOCK

#10 UNPACK  
AREA (UPA)

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. \* TCDS-01-422 DATE: 31 JANUARY 1974
- b. DOCUMENT NO. CAMDS REPAIR PARTS DATE: 29 AUGUST 1975  
(INVENTORY CONTROL SYSTEM)
- c. OTHER TRW GENERATED FMEA DATE: 2 OCTOBER 1975
- d. DISCUSSION WITH TEAD (R. SCHNORENBERG) 21 OCTOBER 1975
- e. COMPONENT SUPPLIER CATALOGS

2. NOTES \* THE DRAWING LISTS SHOW ONE DRAWING FOR THE UNPACK AREA EQUIPMENT.

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER SEE NOTE
- b. OTHER RADC-TR-74-268, FINAL REPORT, OCTOBER 1974, "REVISION OF NONELECTRONIC RELIABILITY NOTEBOOK" (RADC-TR-59-453, SECTION

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCE  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST D.

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

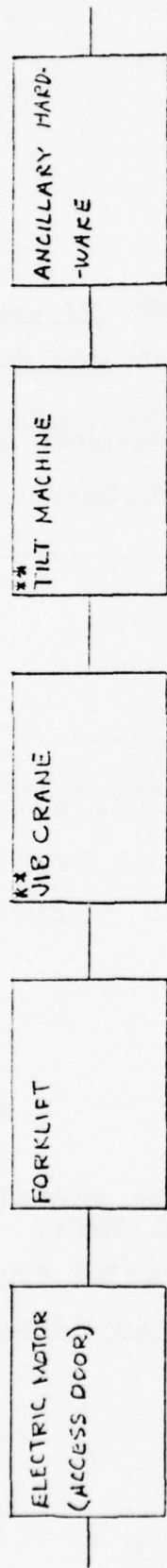
- a. RMA SEE NOTE
- b. TEAD/EA SEE NOTE
- c. OTHER RADC-TDR-64-373, VOL II FINAL REPORT, DECEMBER 1964, "ANALYSIS OF MAINTENANCE TASK TIME DATA"

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCE  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST D.

## D. GENERAL REMARKS

FIRST SUBMITTAL DATE: 11-20-75  
SECOND SUBMITTAL DATE: 12-30-75

# BUILDING BLOCK NO.1-UNPACK AREA (UPA) FLOW CHART\*



\*\* THE JIB CRANE AND TILT MACHINE ARE USED FOR THE ISSAH AND 8 INCH PROJECTILES ONLY.

\* FLOW CHART ADDRESSES HARDWARE ITEMS ONLY. THIS BUILDING BLOCK CONTAINS MANY HUMAN ELEMENTS. REFER TO THE CAMDS FMEA FOR A DISCUSSION OF THESE ELEMENTS.



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 1 UNPACK AREA

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	FAILURE DATA			MAINTAINABILITY DATA					PEIRPMS
								RATE A (x10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	HAZM (x10 <sup>-6</sup> )	SOURCE (*)
1-11	ELECTRIC MOTOR	POWERS ACCESS DOOR TO THE UNPACK AREA.			1	*	3	-	-	-	-	-	-	-	-	-
1-12	FORKLIFT	PLACES PALLETS OF MUNITIONS WITHIN THE UNPACK AREA AND REMOVES DUNNAGE.			1	*	3	-	-	-	-	-	-	-	-	-
1-13	CRANE (INC. AIR POWERED ROLLER CHAIN HOIST AND TROLLEY)	LIFTS 100 MM AND 8 INCH PROJECTILES AND LOWERS THEM ONTO A TILT MACHINE.	7719 D (AIR HOIST) 7702 (TROLLEY)	-	1	*	2	11,562 + 54,798 <sup>A</sup>	11,562 <sup>A</sup> 27,30	54,798 <sup>A</sup>	-	-	-	2 (60.1)	15,564 <sup>A</sup>	EST SEE NOTE IN FUNCTION
		MAINTAINABILITY ESTIMATE: THE MAINTAINABILITY ESTIMATE IS BASED ON AN EXAMINATION OF THE HARDWARE AND ITS APPLICATION. THE HOIST WEIGHTS LESS THAN 37 <sup>B</sup> IS ACCESSIBLE, AND CAN BE REMOVED FROM THE TROLLEY EASILY (REMOVED FROM THE TROLLEY UNIT IS ASSUMED). THEREFORE THE MINIMUM MAINTENANCE TIME (HRS) IS														

IN ORDER TO REPAIR OR REMOVE/REPLACE THE TROLLEY (2 HOURS 22 MIN).  
 INFORMATION IS DETAILED IN Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period

$$\begin{aligned}
 \text{IN1} &= \frac{1}{1 + \frac{\text{MTR}}{\text{MTR}}} \times 10^{-6} \text{ HRS} \\
 \text{INATH} &= \frac{1}{1 + \frac{\text{MTR}}{\text{MTR}}} \times 10^{-6} \\
 \text{MTR} &= \frac{1}{1 + \frac{\text{MTR}}{\text{MTR}}} \times 100\% = \frac{1}{1 + \frac{\text{MTR}}{\text{MTR}}}
 \end{aligned}$$

A Cycle Item

ENA = _____	$\times 10^{-6}/\text{HR}$	INATM = _____	$\times 10^{-6}$
_____	HRS	MTR = $\frac{\text{INATM}}{\text{ENA}}$	_____
AVAILABILITY = $\frac{1}{1 + \text{MTR}} \times 100\%$		_____ %	

Information is detailed in Supplemental Data Sheet

Consequence Code

1 - Catastrophic Failure

1 - Manufacturing Failure  
2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #2 EXPLOSIVE CONTAINMENT CUBICLE (ECC)

MUNITION	AGENT	EXP.	I II III	PROP.	NA	MTBF	NA TM	MTTR	AVA ABI
*M55 ROCKET, GB/VX Rocket, 115mm, M55 20/HK	GB	Comp	B	M28	510.123	1960.29	6125.537	12.01	9.
Rocket, 115mm, M55 20/HK	VX	Comp	B	M28	510.123	1960.29	6125.537	12.01	9.
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS									
Cartridge, 105mm, M360	GB	None		None	NA	NA	NA	NA	1
Projectile, 155mm, M121A1	GB	None		None	NA	NA	NA	NA	1
Projectile, 155mm, M121	GB	None		None	NA	NA	NA	NA	1
Projectile, 155mm, M122	GB	None		None	NA	NA	NA	NA	1
Projectile, 8", M426	GB	None		None	NA	NA	NA	NA	1
Projectile, 155mm, M121A1	VX	None		None	NA	NA	NA	NA	1
*P/C, GB/VX WITH BURSTERS			II 1-9 10						
Cartridge, 105mm, M360	GB	Tetrytol		M1	1133.280	978.514	13344.727	11.72	9.
					1074.272	970.25	12350.705	11.50	9.
*PROJECTILES, MUSTARD WITH BURSTERS			II 1-9 10						
Projectile, 155mm, M110	H	Tetrytol		None	796.688	1255.20	9337.251	11.72	9.
					722.694	1354.33	8343.105	11.59	9.
Projectile, 155mm, M104	HD	Tetrytol		None	796.688	1255.20	9337.251	11.72	9.
					722.694	1354.33	8343.105	11.59	9.
*M23 MINE, VX 40/HK			1-9 11						
Mine, 2 gallon, M23	VX	Comp B		None	862.210	1246.32	9536.234	11.81	9.
*4.2" MORTAR, MUSTARD			1-9 10						
Cartridge, Mortar, 4.2", M2/M2A1 53/HK	HD	Tetryl		M5	1074.272	970.25	12350.705	11.50	9.
Cartridge, Mortar, 4.2", M2/M2A1 53/HK	HT	Tetryl		M6	1074.272	970.25	12350.705	11.50	9.

\*MUNITION DEMILITARIZATION PROCESS FLOW



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #2 EXPLOSIVE CONTAINMENT CUBICLE (ECC)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NATM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NA	NA	NA	NA	N
Tank, Spray, TMU-28/B	VX	None	None	NA	NA	NA	NA	N
Ton Container	GB	None	None	NA	NA	NA	NA	N
Ton Container	VX	None	None	NA	NA	NA	NA	N
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	N

SUPPLEMENTAL DATA

BUILDING BLOCK

#2 EXPLOSIVE

CONTAINMENT CUBICLE

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. SEE ATTACHED DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_

\_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

\_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

\_\_\_\_\_

D. GENERAL REMARKS: FAILURE RATES AND MAINTENANCE TIME  
FOR OUR CYCLES INCLUDE ASSOCIATED MECHANISMS

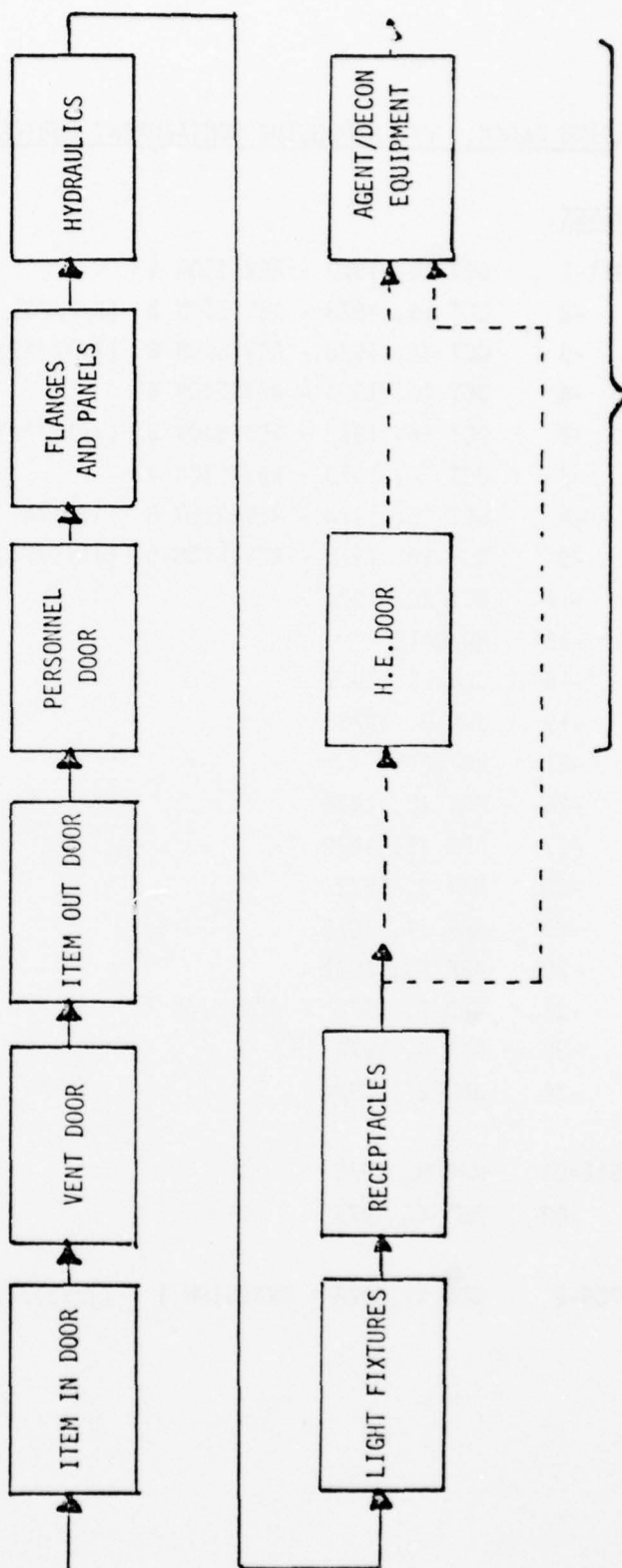
BUILDING BLOCK: #2 EXPLOSIVE CONTAINMENT CUBICLE (ECC)

DRAWINGS:

02-311-1      OCT 16, 1970 - REVISION 4  
          -2      OCT 16, 1970 - REVISION 3 (7/7/73)  
          -3      OCT 16, 1970 - REVISION 2 (7/17/73)  
          -4      OCT 16, 1970 - REVISION 4  
          -6      OCT 16, 1970 - REVISION 3 (7/17/73)  
          -7      OCT 16, 1970 - REVISION 4  
          -8      OCT 16, 1970 - REVISION 5 (4/5/74)  
          -9      OCT 16, 1970 - REVISION 5 (11/5/74)  
          -14     OCT 30, 1974  
          -15     NO DATE  
          -16     JUN 29, 1972  
          -19     JUN 9, 1973  
          -21     NO DATE  
          -26     MAY 10, 1975  
          -27     APR 25, 1972  
          -28     MAY 3, 1972  
          -29     APR 27, 1972  
          -30     APR 20, 1972  
          -31     APR 7, 1972 - REVISION 1  
          -32     APR 4, 1974  
          -34     JUN 27, 1974  
  
02-512-01      MAY 8, 1975  
          -02      JUN 6, 1975  
  
02-706-6      OCT 1, 1973 - REVISION 1 (12/21/73)

BUILDING BLOCK #2 EXPLOSIVE CONTAINMENT CUBICLE (ECC)

FLOW CHART



AS APPLICABLE FOR REQUIREMENTS OF SPECIFIC MUNITIONS







EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK														
CUBICLE (ECC)														
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$INA = \frac{76.469 \times 10^{-6}}{1.135 \times 10^{-6}}$   
 $MTBF = \frac{1}{INA} = \frac{1}{1.135 \times 10^{-6}} = 881,057 \text{ HRS}$   
 $MTTR = \frac{1}{MTR} = \frac{1}{1.135 \times 10^{-6}} = 881,057 \text{ HRS}$   
 $AVAILABILITY = \frac{MTBF}{MTBF + MTTR} = \frac{881,057}{881,057 + 881,057} = 0.5$

\* Information is detailed in Supplemental Data Sheet  
 \*\* Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

✓ p. 1/4

SHEET 2 OF 5  
#2 EXPLOSIVE CONTAINMENT  
BUILDING BLOCK CUBICLE (ECG)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION							FAILURE DATA				MAINTAINABILITY DATA					REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	NA TM $\times 10^{-6}$	SOURCE (*)	REMARKS
Light Fixtures				8	(75-1) 06	2	1465									
Accessories	ELECTRICAL TEST THRU	SEVEN 101	1747L	9	(301) 14-2	2	1460	1460	1.65	1.0	2.0	1.0	4.0	1472	Est	Conf. Gnd

17

$$LNA = 7.68 \times 10^{-6}/HR \quad ENATH = 1472 \times 10^{-6}$$

$$MTBF = \frac{1}{LNA} = \frac{1}{7.68 \times 10^{-6}} = \text{HRS} \quad MTR = \frac{ENATH}{LNA} = \text{HRS}$$

$$AVAILABILITY = \frac{1}{1 + MTR \times 100\%} = \%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Sequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure





103 10/1/85

SHEET 2 OF 2  
#2 EXPLOSIVE CONTAINMENT  
CURBULE (ECC)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK				BUILDING BLOCK				BUILDING BLOCK				BUILDING BLOCK			
DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	NATH (X10 <sup>-6</sup> )	SOURCE (*)
Su Valve w/ Switch	Agcent - Inside ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Su Valve w/ Switch	Agcent - Outside ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Su Valve w/ Switch	Deton Inlet - INSIDE ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Su Valve w/ Switch	Deton Inlet - OUTSIDE ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Su Valve w/ Switch	Deton Outlet - INSIDE ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Su Valve w/ Switch	Deton Outlet - OUTSIDE ECC			1		2	2.409	2409	2409				2.6	6.2614	1.37
Quicker, MC	Operate Isolating Valve			2		2	12.104	12104	12104				4.0	39.896	1.15
Thick, HAWK	Deton			1		2	2.409	2409	2409				2.6	6.2614	1.37
Lower, SERVICE	Deton Lower			1		2	2.409	2409	2409				2.6	6.2614	1.37
Pump, Deton, Ag	Pump Down to ETS			1		2	2.409	2409	2409				2.6	6.2614	1.37
Valve, Quick	Agcent Upstream to ADS			1		2	2.409	2409	2409				2.6	6.2614	1.37
Valve, Quick	Shut Line to Pump Agcent			1		2	2.409	2409	2409				2.6	6.2614	1.37
Valve, Quick	Pump Agcent			1		2	2.409	2409	2409				2.6	6.2614	1.37

\* Information is detailed in Supplemental Data Sheet  
 \*\* Failure sequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Equipment Failure

ENA =  $117.579 \times 10^{-6} / \text{HR}$   
 EN2 =  $63.794 \times 10^{-6}$   
 MTBF =  $\frac{1}{\text{ENA}}$   
 MTTR =  $\frac{1}{\text{EN2}}$   
 AVAILABILITY =  $\frac{1}{1 + \frac{\text{MTTR}}{\text{MTBF}}} \times 100\%$

ENA =  $448.672 \times 10^{-6}$   
 EN2 =  $249.445 \times 10^{-6}$   
 MTTR =  $\frac{1}{\text{EN2}}$   
 AVAILABILITY =  $\frac{1}{1 + \frac{\text{MTTR}}{\text{MTBF}}} \times 100\%$

EQUIP VIEW FOR  
 DECON OPERATIONS

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #4 DEACTIVATION FURNACE SYSTEM (DFS)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	2520.1	396.8	17417.3	6.91	.98
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	—	—	—	—	—
Projectile, 155mm, M121A1	GB	None	None	—	—	—	—	—
Projectile, 155mm, M121	GB	None	None	—	—	—	—	—
Projectile, 155mm, M122	GB	None	None	—	—	—	—	—
Projectile, 8", M426	GB	None	None	—	—	—	—	—
Projectile, 155mm, M121A1	VX	None	None	—	—	—	—	—
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	2520.1	396.8	17417.3	6.91	.98
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	7	7	7	7	7

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #4 DEACTIVATION FURNACE SYSTEM (DFS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	—	—	—	—	—
Tank, Spray, TMU-28/B	VX	None	None	—	—	—	—	—
Ton Container	GB	None	None	—	—	—	—	—
Tone Container	VX	None	None	—	—	—	—	—
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	—	—	—	—	—



SUPPLEMENTAL DATABUILDING BLOCK  
# 4 DEACTIVATION  
FURNACE SYSTEM (DFS)  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available

## D. GENERAL REMARKS

## BUILDING BLOCK: #4 DEACTIVATION FURNACE SYSTEM (DFS)

# FLOW CHART

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

APP Comment  
4-1 Chaotic Table

BUILDING BLOCK

DESCRIPTION						FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NO.	ITEM NAME	FUNCTION	PART NO. (SEE 22)	MFG CODE NO.	QTY (N)	INFO. SOURCE (S)	FAIL CONSEQ. (C)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (S)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT. TIME (HR)	N/A TM (X10 <sup>-6</sup> )	SOURCE (S)
1	TANK	ONASTIC SUPPLY TANK	D 655		1	3-01	2	3.035	P38		0.5	12.5	1.0	14.0		P38	Time over for tank pt
11	VALVE, HAND	MISC 5/8	--		7	"	2	2.451	P45		0.5	1.0	0.5	2.0		P45	100% material check pt
	"	"	--		3	"	3	--		NA	--	--	--	--	NA	--	100% material check pt
12	VALVE	BLOCK VALVE ROTO	R070		1	"	2	1.515	P41		0.5	1.4	0.5	2.4		P41	100% material check pt
13	LEVEL CHOC	TANK LEVEL LG LOCAL	LG		1	"	3	--		NA	--	--	--	--	NA	--	100% material check pt
14	LEVEL IND	"	LOST 12		1	"	2	11.905	P25		0.5	1.0	0.5	2.0		P25	100% material check pt
15	LEVEL ALARM	ALARM ASSIG IN 14 AND 15 LAPSW DIS OF ALARM (DRAIN)	--		2	"	2	3.742	P35		0.5	1.0	0.5	2.0		P35	100% material check pt
24	TEMPERATURE	TEMP IND LOCAL TANK	51		1	"	3	--		NA	--	--	--	--	NA	--	100% material check pt
27	PRESSURE	PRESS IND LOCAL PUMP AIR	51		1	"	3	--		NA	--	--	--	--	NA	--	100% material check pt
28	FLOW	FLOW IND TO ROT TANKS	F055		1	"	2	2.975	P40		0.5	1.5	0.5	2.5		P40	100% material check pt
29	PUMP	ONASTIC PUMP (W S.T.)	P-360		1	"	2	12.051	P30		0.5	3.5	1.0	5.0		P30	100% material check pt
30	MOTOR	MOTOR FOR PUMP 3 MP	--		1	"	2	1.206	P23		0.5	2.0	0.5	3.0		P23	100% material check pt
31	VALVE	CHECK VALVE	--		2	"	2	3.014	P41		0.5	1.0	0.5	2.0		P41	100% material check pt

22. 200501-153 -  
6. CHAOS FAL. RATE 5' MAINT. REC. FORMER  
\*Information is detailed in Supplemental Data Sheet  
\*\*Failure Consequence Code  
1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

MTBF =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
ENR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
MTTR =  $\frac{\text{ENR}}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
ENR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
AVAILABILITY =  $\frac{1}{1 + \text{MTBF}}$  =  $\frac{1}{1 + 1}$  = 0.5





APC Control System

4-3 Servomotor Transducer

SHEET 2 OF 11  
#4 DEACTIVATION FURNACE  
SYSTEM (OFS)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS			
ITEM NO.	ITEM NAME	FUNCTION	PART NO. OR ID NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> )	SOURCE (*)
3	Strainer				1	A-01	2	3.035	P19		0.5	12.5	0.5	14.0	P39	Test results good
31	Alarm Valve	Alarm S/b			40	A-01	2	2.113	P45		0.5	1.0	0.5	2.0	P45	Alarm valve good
32	"	"			10	"	3	—	—	N/A	—	—	—	—	—	Alarm Valve good
33	Valve	Block Valve	71-51		3	"	2	16.55	P41		0.5	1.4	0.5	2.4	P41	Alarm Valve good
34	Valve	Control Valve	71-51, 71-52, 71-53, 71-54		3	"	2	16.55	P41		0.5	1.4	0.5	2.4	P41	Alarm Valve good
35	Control Valve	Recirculation Control Valve	71-51, 71-52, 71-53, 71-54		6	"	2	3.711	P41		0.5	1.0	0.5	2.0	P39	Alarm Valve good
36	Transducer	Local Transducer	53, 54		2	"	3	—	—	N/A	—	—	—	—	—	Alarm Valve good
37	Transducer	Local Transducer	53, 54		3	"	3	—	—	N/A	—	—	—	—	—	Alarm Valve good
38	Transducer	Local Transducer	71-51, 71-52, 71-53, 71-54		4	"	2	12.035	P20		0.5	3.5	1.0	5.0	P20	Alarm Valve good
39	Transducer	Local Transducer	71-51, 71-52, 71-53, 71-54		10	"	2	12.06	P20		0.5	3.0	0.5	4.0	P20	Alarm Valve good
40	Transducer	Local Transducer	71-51, 71-52, 71-53, 71-54		6	"	2	3.711	P41		0.5	1.0	0.5	2.0	P41	Alarm Valve good
41	Transducer	Local Transducer	71-51, 71-52, 71-53, 71-54		1	"	3	—	—	N/A	—	—	—	—	—	Alarm Valve good
42	Transducer	Local Transducer	71-51, 71-52, 71-53, 71-54		1	"	2	3.035	P39		0.5	12.5	0.5	14.0	P39	Alarm Valve good

a. ECU-001-120-  
 b. See Chapter 11 for details  
 \*Information is detailed in Supplemental Data Sheet (11-111-111)  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

INA =  $\frac{1}{\text{MTBF}} \times 10^{-6}$  /HR  
 ENATM =  $\frac{1}{\text{MTTR}} \times 10^{-6}$   
 MTBF =  $\frac{1}{\text{INA}}$   
 MTTR =  $\frac{1}{\text{ENATM}}$   
 AVAILABILITY =  $\frac{1}{1 + \frac{\text{MTTR}}{\text{MTBF}}} \times 100\%$

A/P Control System

SHEET 4 OF 11  
DEACTIVATION FURNACE  
SYSTEM (DEFS)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

4-4 LENTEN-TOW TANKS

BUILDING BLOCK #4

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS			
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	N/A TM (X10 <sup>-6</sup> )	SOURCE (*)
41	TANK	RETENTION TANK	0651 651 651	-	3	(5-21) 8-18-16	2	3.015	P35	-	0.5	12.5	0.5	14.0	-	P35	Tank over 500 Gals
41	FLAND VALVE -IN-	MISC 5/6	-	-	16	"	2	2.45	P45	-	0.5	1.0	0.5	2.0	-	P45	Valve 1600 - Gals 14
42	"	"	-	-	15	"	3	-	-	N/A	-	-	-	-	N/A	-	Valve 1600 - Gals 14
43	VALVE	Block VALVE	0651 651 651	-	9	"	2	16.515	P41	-	0.5	1.4	0.5	2.4	-	P41	Valve 1600 - Gals 14
43	TEMP	LOCAL TEMP IND	0651 651 651	-	3	"	3	-	-	N/A	-	-	-	-	N/A	-	Valve 1600 - Gals 14
44	PRESS	LOCAL PRESS. IND	0651 651 651	-	3	"	3	-	-	N/A	-	-	-	-	N/A	-	Valve 1600 - Gals 14
45	LEVEL GAGE	LOCAL TANK LEVEL	LG	-	3	"	3	-	-	N/A	-	-	-	-	N/A	-	Valve 1600 - Gals 14
46	LEVEL IND	TANK LEVEL	LG	-	3	"	2	11.905	P25	-	0.5	1.0	0.5	2.0	-	P25	Valve 1600 - Gals 14
47	ALARM	ALARM ASSOC W. 46	LLA	-	3	"	2	3.74	P25	-	0.5	1.0	0.5	2.0	-	P25	Valve 1600 - Gals 14
48	PUMP	ALARM PUMP	P35 35 35	-	3	"	2	12.018	P30	-	0.5	3.5	1.0	5.0	-	P30	Valve 1600 - Gals 14
49	MOTOR	MOTOR FOR -48 3HP	-	-	3	"	2	13.06	P28	-	0.5	2.0	0.5	3.0	-	P28	Valve 1600 - Gals 14
410	OVERC VALVE	MISC	-	-	9	"	2	3.014	P41	-	0.5	1.0	0.5	2.0	-	P41	Valve 1600 - Gals 14

A. EQUIPMENT 150 -  
See Control File Folder  
\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Major Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$\begin{aligned}
 \text{MTBF} &= \frac{1}{\text{INA}} = \frac{1}{\text{HRS}} \\
 \text{MTTR} &= \frac{1}{\text{HRS}} \\
 \text{AVAILABILITY} &= \frac{\text{MTBF}}{1 + \text{MTBF}} \times 100\% = \frac{1}{1 + \text{MTBF}} \times 100\% \\
 \text{INATM} &= \frac{\text{INATM}}{\text{INA}} = \frac{\text{INATM}}{\text{HRS}} \\
 \text{INATM} &= \frac{\text{INATM}}{\text{HRS}}
 \end{aligned}$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

EXPLOSION BY-PRODUCT SYSTEM															BUILDING BLOCK SYSTEM (JCS)																																												
DESCRIPTION															FAILURE DATA															MAINTAINABILITY DATA															REMARKS														
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)																																											
1	Blower	AIR FLOW EFFICIENT	20-374	-	1	0-01	2	1.667	P17		0.5	3.6	0.5	4.6		P-17	Blow - Check - Good																																										
2	Motor	Motor for S. 1 200/50 HP	-	-	1	"	2	5.724	P25		0.5	6.0	0.5	7.0		P-25	Motor - Check - OK																																										
3	Flow Valve	MISC	-	-	2	"	2	1.45	P45		0.5	1.0	0.5	2.0		P-45	Flow Valve - Check - OK																																										
4	Gate	-	-	-	1	"	2	5.05	P39		0.5	13.5	1.0	14.0		P-39	Gate - Check - OK																																										
5	Damper	BLR INLET	-	-	1	"	2	1.89	P41		0.5	1.5	0.5	2.5		P-41	Damper - Check - OK																																										
6	Blower	Damper Disposal	Y052	-	1	"	2	15.235	P15		0.5	2.5	1.0	4.0		P-15	Blow - Check - OK																																										
7	Recuperator	DIFFERENTIAL PRESSURE	P32	-	1	"	2	1.344	P32		0.5	1.0	0.5	2.0		P-32	Recuperator - Check - OK																																										
8	Alarm	Alarm for S. 7	Y114	-	1	"	2	3.74	P15		0.5	1.0	0.5	2.0		P-15	Alarm - Check - OK																																										
9	Detector	Alarm Sensor	-	-	3	"	2	3.74	P15		0.5	1.0	0.5	2.0		P-15	Detector - Check - OK																																										
10	Slam	Isolation Valve	-	-	2	0-01	2	3.05	P19		0.5	13.5	1.0	14.0		P-19	Slam - Check - OK																																										
11	Pump	Slam Pump	P15	-	2	"	2	12.053	P30		0.5	3.5	1.0	5.0		P-30	Pump - Check - OK																																										
12	Motor	Motor for S. 2 500 HP	-	-	2	"	2	1.835	P18		0.5	2.0	0.5	3.0		P-18	Motor - Check - OK																																										
13	Level Gauge	Level Gauge	L1C	-	2	"	2	11.95	P15		0.5	1.0	0.5	2.0		P-15	Level Gauge - Check - OK																																										
14	Flow Valve	MISC	-	-	2	"	2	2.483	P41		0.5	1.0	0.5	2.0		P-41	Flow Valve - Check - OK																																										
15	Check Valve	MISC	-	-	2	"	2	3.04	P41		0.5	1.0	0.5	2.0		P-41	Check Valve - Check - OK																																										

$ENA = \frac{1}{\sum \frac{1}{MTTR}} \times 10^{-6} / \text{HR}$   
 $INATM = \frac{1}{\sum \frac{1}{MTTR}} \times 10^{-6}$   
 $MTTR = \frac{INATM}{ENA}$   
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$

a. 6/15/04 - 1507  
 b. See Drawings for details.  
 \* Information is detailed in Supplemental Data Sheet  
 \*\* Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Process 40000 (See Consequence Code Sheet 40000-151)

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	SOURCE (*)
71	TANK	Water Shut Tank	D671	-	1	4-01	1	1.64	P31	-	0.5	12.5	1.0	P-39
72	Flow, Shut N	Misc	-	-	19	"	2	1.76	P45	-	0.5	1.0	0.5	P-45
73	Pump	Water Pump	P-325	-	1	"	2	12.03	P30	-	0.5	3.5	1.0	P-30
74	Motor	Motor For 1.3	-	-	1	"	2	1.34	P-9	-	0.5	3.0	0.5	P-24
75	Valve, Control	Level Control on Tank	43440	-	1	"	2	16.55	P41	-	0.5	1.0	0.5	P41
76	Level, INO	Tank Level	43442	-	1	"	2	11.95	P15	-	0.5	1.0	0.5	P15
77	Level, GAGE	" Local	46	-	1	"	3	-	-	NA	-	-	-	-
78	Pressure	Press, Level Motor	43440	-	2	"	2	3.74	P15	-	0.5	1.0	0.5	P15
79	Pressure	70 Pressure op	-	-	1	"	2	2.97	P11	-	0.5	1.4	0.5	P11
80	Pressure	Water Supply Press.	P435	-	1	"	2	1.02	P15	-	0.5	1.0	0.5	P15
81	Consequence	Emergency Consequence (40000-151)	-	-	1	"	2	3.74	P15	-	0.5	1.0	0.5	P15

a. 40000-151 - (See 40000-151)  
 b. See 40000-151 for details  
 Information is detailed in Supplemental Data Sheet  
 Failure Consequence Code  
 1 - stoppage Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

INATM =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 100\%$   
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EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #4 DEACTIVATION FURNACE SYSTEM (UFS)									
EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA									
FAILURE DATA									
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)
8.1	Minor valve - 1st	Atisc.	—	—	34	2-01	2	1.726	P15
8.2	TANK	Gascon - Water Tank	—	—	11	3	3	—	NA
8.3	Water Heater	Atisc. Tank, Heat (Geyser)	0472	—	1	11	2	1.616	P34
8.4	Heating Coil w/ Valve	Atisc. Tank, Heat (Geyser)	—	—	4	11	2	2.581	P14
8.5	Control Valve	Atisc. Area (See Data)	—	—	7	11	2	3.677	P14
8.6	Temp 2nd Control	Steam, 1st Geyser, Water	742, 442, 443, 444	—	5	11	2	16.55	P11
8.7	Temp Control	Steam, 1st Geyser, Water	742, 442, 443, 444, 445, 446	—	5	11	2	15.880	P14
8.8	Liquid Control	Level Geyser-Water Tank	44512	—	1	11	2	11.945	P15
8.9	Water	Temp Switch	742, 442	—	2	11	2	2.511	P34
8.10	Control Valve	Gascon Water Control	10 372, 101	—	2	11	2	2.415	P14
8.11	Alarm	Temp, Level	742, 442	—	2	11	2	3.742	P15
8.12	Temp 2nd	Local Temp Heating	See Data	—	4	11	3	—	NA
8.13	Pump	Gascon - Water Pump	P343	—	1	11	2	12.088	P30
8.14	Alarm	Water For Pump 1st	—	—	1	11	2	1.206	P14
8.15	Press. Tank	Local Press. Control, Atisc.	Atisc. Tank	—	14	11	3	—	NA
8.16	Control Valve	Atisc. Control Valve	—	—	6	11	2	3.044	P11

MAINTAINABILITY DATA IF									
DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	N.A.T.M. (X10 <sup>-6</sup> )	SOURCE (*)	REMARKS			
0.5	1.0	0.5	2.0	—	P15	Atisc. 2nd geyser			
—	—	—	—	NA	—	—			
0.5	12.5	1.0	14.0	—	P34	Water pump 1st geyser			
0.5	3.2	0.5	4.2	—	P14	Water pump 2nd geyser			
0.5	3.0	1.0	4.5	—	P35	Water pump 3rd geyser			
0.5	2.0	1.0	3.5	—	P35	Water pump 4th geyser			
0.5	2.0	1.0	3.5	—	P36	Water pump 5th geyser			
0.5	1.0	0.5	2.0	—	P37	Water pump 7th geyser			
0.5	1.0	0.5	2.0	—	P37	Water pump 8th geyser			
—	—	—	—	NA	—	—			
0.5	3.5	1.0	5.0	—	P30	Water pump 11th geyser			
0.5	4.0	0.5	5.0	—	P39	Water pump 12th geyser			
—	—	—	—	NA	—	—			
0.5	1.0	0.5	2.0	—	P41	Water pump 13th geyser			

d. 6003-104-152 (Rev. 10/8/72)

6. See Defaults For geyser

\*Information is detailed in Supplemental Data Sheet

See Date Sheet for parallel items

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

ENATM =  $\frac{1}{\text{ENATM}}$  x 10<sup>-6</sup> HR

ENATM =  $\frac{1}{\text{ENATM}}$  x 10<sup>-6</sup>

MTTR =  $\frac{1}{\text{MTTR}}$  x 100%

MTTR =  $\frac{1}{\text{MTTR}}$  x 100%

AVAILABILITY =  $\frac{1}{1 + \text{MTBF}}$

AVAILABILITY =  $\frac{1}{1 + \text{MTBF}}$

$ENR = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 10^{-6} / HR$   
 $ENR = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 10^{-6}$   
 $ENR = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 10^{-6}$

See Data Sheet for detailed data  
 MTDF =  $\frac{1}{ENR}$   
 MTTR =  $\frac{1}{ENR}$   
 ENR =  $\frac{1}{MTTR} \times 100\%$

1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK SYSTEM (DEF)										BUILDING BLOCK SYSTEM (DEF)									
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$MTBF = \frac{1}{\frac{1}{ENR} + \frac{1}{MTR}}$ 
 $ENR = \frac{1}{\frac{1}{ENR} + \frac{1}{MTR}}$ 
 $MTR = \frac{1}{\frac{1}{ENR} + \frac{1}{MTR}}$ 
 $INATM = \frac{1}{\frac{1}{ENR} + \frac{1}{MTR}}$ 
 $INATM = \frac{1}{\frac{1}{ENR} + \frac{1}{MTR}}$

$AVAILABILITY = \frac{1}{1 + \frac{MTR}{MTBF}} \times 100\%$

1 - See Note 414  
 2 - See Note 414  
 3 - See Note 414  
 4 - See Note 414

- 1 - Strophic Failure
- 2 - Junction Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

MISS. THIS REFLECTS THE PRESENT STATUS OF THE EQUIPMENT AND ITS MAINTAINABILITY DATA.

BUILDING BLOCK

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA				REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N.A. TM (X10 <sup>-6</sup> )	SOURCE (*)		
01	Pump, 1000 gal		---	---	1	b	2	1.14	P30		1.0	7.0	2.0	10.0		P30	Pump 1000 gal	
02	Motor	Motor for A.1 7.5HP	---	---	1	b	2	1.10	P34		1.0	6.0	1.0	8.0		P34	Motor 1000 gal	
03	Fuel oil Pump		---	---	2	b	2	12.50	P30		0.5	3.5	1.0	5.0		P30	Pump 1000 gal	
04	Motor	Motor for A.3 1.5HP	---	---	2	b	2	2.45	P35		0.5	1.5	0.5	2.5		P35	Motor 2HP	
05	Large oil tank		---	---	1	b	2	1.34	P34		1.0	6.4	1.0	8.4		P34	Motor 1000 gal	
06	Motor	Motor for A.5 7.5HP	---	---	1	b	2	1.20	P34		1.0	6.0	1.0	8.0		P34	Motor 1000 gal	
07	Blower	Blower for A18 HL 571,372	HL-571 572	---	2	a,b	2	1.34	P34		1.0	7.2	1.0	9.2		P34	Motor 1000 gal	
08	Motor	Motor for A.7 25HP	---	---	2	b	2	1.20	P34		1.0	6.0	1.0	8.0		P34	Motor 1000 gal	
09	FAN	Blower 1000 gal 1000 gal	---	---	2	b	2	1.34	P34		1.0	7.2	1.0	9.2		P34	Motor 1000 gal	
10	Blower	Motor for A.9 5HP	---	---	2	b	2	3.04	P34		1.0	5.0	1.0	7.0		P34	Motor 1000 gal	
11	Tank	Fuel oil tank	---	---	1	a	2	2.87	P34		0.5	6.5	1.0	8.0		P34	Motor 1000 gal	
12	Blower	Blower 1000 gal	---	---	1	a	2	1.5	P34		1.0	2.5	2.0	7.0		P34	Motor 1000 gal	
13	Cyclone	Blower 1000 gal	---	---	1	a	2	3.25	P34		1.0	2.5	2.0	7.0		P34	Motor 1000 gal	
14	Valve	Air lock valve, cyclone	---	---	1	a	2	1.5	P34		1.0	5.0	1.0	7.0		P34	Motor 1000 gal	
15	Valve	Double tank valve	---	---	1	a	2	1.5	P34		1.0	5.0	1.0	7.0		P34	Motor 1000 gal	

ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ ENATM =  $\frac{1}{MTBF} \times 100\%$ 

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - Gas Supplemental Data Sheet

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

MISC - CONTINUED

BUILDING BLOCK #4

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS			
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE (X 10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)
10.6	Valve	DISCHARGE CONVEYOR DRIVE (EGR)	—	—	1	2	2	10	EST		1.0	5.0	1.0	7.0		EST	
10.7	Conveyer	SEAL CONVEYER	—	—	1	2	2	70	EST		1.0	6.0	1.0	8.0		EST	
CONT'D ON PAGE 10A →																	
11.1	Ventilation Fan	Duct wheel	—	—	2	2	2	1.206	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A
11.2	MOTOR	7 1/2 HP	—	—	1	2	2	1.205	P41		0.75	4.5	0.75	6.0		P41	REPAIR 10A
11.3	CONVEYOR DRIVE			51244	1	2	2	8.05	P19		1.0	4.0	1.0	6.0		EST	REPAIR 10A
11.4	Piston Conveyer			64955	2	2	2	1.242	P19		0.75	4.0	0.75	6.0		P19	REPAIR 10A
11.5	ROSE VENTILATION			01013	3	2	2	2.311	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A
11.6	FAN	VENTILATION FAN	—	30191	1	2	2	2.311	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A
11.7	MOTOR	MOTOR FOR FAN	—	—	1	2	2	2.311	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A
11.8	Piston FAN		110262	01767	6	2	2	1.201	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A
11.9	AIR FLOWER		57900		2	2	2	3.92	P19		0.75	4.5	0.75	6.0		P19	REPAIR 10A

INATM =  $\frac{1}{\text{INATM}} \times 10^{-6}$

MTBF =  $\frac{1}{\text{MTBF}} \times 10^6$  HRS

MTTR =  $\frac{1}{\text{MTTR}} \times 100\%$

AVAILABILITY =  $\frac{1}{1 + \text{MTTR}} \times 100\%$

INATM =  $\frac{1}{\text{INATM}} \times 10^{-6}$

MTTR =  $\frac{1}{\text{MTTR}} \times 100\%$

AVAILABILITY =  $\frac{1}{1 + \text{MTTR}} \times 100\%$

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - stoppage failure
- 2 - action line shutdown failure
- 3 - minor failure - repair during maintenance period
- 4 - see supplemental data sheet



12/1/75

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

MISC - CONT'D {NOTE: THESE ITEMS NOT FOUND ON DWS AVALIA (P.170), BUT TEMP FROM SUPER COND. FURN. REPAIR BUILDING BLOCK

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA Z X				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (1*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N A T M (X10 <sup>-6</sup> )	SOURCE (*) (S)
CHARGE	FEED 3 DISCHG CHARGES			2	(1)	2	10	EST					5		EST	VAL CONTIN AIR G.S
VALVE ASSY	VALVE OP MAIN BRK VAL ASSY (ON)			1	"	2	16.515	P41					4.8		P41	VAL OIL G.S
"	SUPPLY (CONTIN) LINE INLET VALVE ASSY			1	"	2	4.219	P44					4		EST	VAL OIL G.S
FILTER	DUAL OIL FILTERS			2	"	2	2.487	P21					6.4		P21	VAL OIL G.S
VALVES	FILTER SELECTOR VALVES			2	"	2	4.219	P44					4		EST	VAL OIL G.S
REGULATOR	OIL PRESSURE REGULATOR			1	"	2	2.249	P32					5.8		P32	VAL CONTIN AIR G.S
VALVE	BURNER BLOCK OIL VAL			1	"	2	16.515	P41					4.8		P41	VAL CONTIN AIR G.S
"	SAFETY SHUTOFF VAL (ON)			1	"	2	16.515	"					4.8		P41	"
VALVE ASSY	AIR-OIL CONTIN VAL ASSY			1	"	2	16.515	"					4.8		"	"
VALVE	RATIO ADJUSTING OIL VALVE			1	"	2	16.515	"					4.8		"	"
DETECTOR	UV FLAME DETECTOR			1	"	2	3.742	P25					4.0		P25	VAL OIL G.S
VALVE ASSY	INT BURNER INLET AIR CONTIN VALVE			2	"	2	16.515	P41					4.8		P41	VAL CONTIN AIR G.S
CONTROLLER	TEMP RECORDING CONTROLLER			1	"	2	4.338	P32					9.0		P32	VAL CONTIN AIR G.S
VALVE	MANUAL BLOCKING VALVE (OIL)			1	"	2	4.219	P44					4		EST	VAL OIL G.S
"	SAFETY 3/0 VALV AIRB			1	"	2	16.515	P41					4.8		P41	VAL CONTIN AIR G.S
CONTROLLER	TEMP CONTROLLER, DISCHG CONVEYOR			1	"	2	4.338	P32					9.0		P32	VAL CONTIN AIR G.S
SENSOR	TEMP SENSOR, DISCHG CONVEYOR			1	"	2	25.692	P40					6.0		P40	VAL CONTIN AIR G.S

(1) Repair Availability Existed in Aug 1975, But Rec'd @ New Week of 5 DEC 1975

(2) ASSUMED

Information is detailed in Supplemental Data Sheet

(3) See Column 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

MTBF =  $\frac{1}{\text{ENR}}$  = 1

MTTR =  $\frac{1}{\text{MTR}}$  = 1

ENR = 1

MTR = 1

ENR = 1

MTR = 1

ENR = 1

MTR = 1

AVAILABILITY =  $\frac{1}{1 + \frac{\text{MTR}}{\text{MTBF}}} \times 100\%$  = 100%

ENR = 1

MTR = 1

ENR = 1

MTR = 1

ENR = 1

MTR = 1



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA  
11-1 Free Compressors From Space Line Diagram ECD504-550-02

BUILDING BLOCK SYSTEM (DPS)															
11-1 Free Computers from Spine Line Diagram ECD04-550-02															
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$INA = \frac{1}{MTBF} \times 10^{-6}/HR$        $INA = \frac{1}{MTBF} \times 10^{-6}$        $INATM = \frac{1}{MTBF} \times 10^{-6}$   
 $MTBF = \frac{1}{INA}$        $MTTR = \frac{1}{MTBF}$        $MTTR = \frac{1}{MTBF}$        $MTTR = \frac{1}{MTBF}$   
 $AVAILABILITY = \frac{1}{1 + MTTR} \times 100\% = \frac{1}{1 + MTTR} \times 100\%$

\*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Mission Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

# SUMMARY - BUILDING BLOCK: #4 DEACTIVATION FURNACE SYSTEM (DFS)

Sub Item No. (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)

Engine Type	4.1	105.6	304.6	1X	603.2	2X
Wt. (lbs)	4.2	105.4	332.7	1X	615.4	2X
Engine Type	4.3	268.4	783.7	1X	1567.4	2X
Wt. (lbs)	4.4	311.3	903.5	1X	1807.0	2X
Engine Type	4.5	48.8	148.4	1X	394.8	2X
Wt. (lbs)	4.6	74.6	304.1	1X	608.2	2X
Engine Type	4.7	46.6	158.1	1X	158.1	1X
Wt. (lbs)	4.8	361.3	1227.6	1X	1841.4	1.5X
Engine Type	4.9	442.1	3054.7	2X	4582.1	3X
Wt. (lbs)	4.10	378.4	2818.8	2X	4228.2	3X
Engine Type	4.11	62.9	300.6	1.5X	300.6	1.5X
Wt. (lbs)	4.12	314.7	638.9	1X	638.9	1X

Σ 2520.1 ✓  
X10-6

(4) 17417.3 ✓  
X10-6

$$A = 2229 \checkmark$$

$$MTBF = 396.8 - \quad (4)$$

$$MTTC = 6.91 -$$

- (1) As Listed on Raw Data Sheets
- (2) Final DB No's
- (3) Measure Together as Furnace
- (4) Change 12/11/75 A of page 10A

DFS: Minimum on 4000 in 1000000

1-2 Q: Given 4.500000

$$\begin{aligned} \Delta_1 &= \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \end{aligned}$$

$$\begin{aligned} \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \end{aligned}$$

$$\begin{aligned} \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \end{aligned}$$

$$\begin{aligned} \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \\ \Delta_1 &= \Delta_{10} + \Delta_{10} \\ \Delta_2 &= \Delta_{10} + \Delta_{10} \end{aligned}$$

For this page:

$$\begin{aligned} \Delta_1 &= 5.321 + 28.641 + 36.679 + 21.51 = 92.2 \\ \Delta_2 &= 10.1 + 66.091 + 74.128 + 49.643 = 200.5 \end{aligned}$$

DFS Applied Items (contd).

4-3 Sommer! Tower

- 2 HV + CONTR VALVE W. PAC. W. HV (3 PAGES)

$$2.483 \times 2 \times (2) + 16.515 \times 1 \times (2.4) = 7$$

$$\left. \begin{array}{l} A_1 = 21.51 \times 10^{-6} \\ A_2 = 49.613 \end{array} \right\} \begin{array}{l} \text{See} \\ \text{QTS'} \\ \text{V. Sec. 2.} \end{array}$$

$$2.483 \times 1 \times (2)$$

For Tower  $\Delta_1 = 3 \times 21.51 = 64.53 \times 10^{-6}$       64.5

$$A_2 = 3 \times 49.613 = 148.839 \times 10^{-6} \quad 148.8$$

4-7 Process Water

1. 20V, Ck, Conn V in Pwr w. Same

$\Delta_1 = 36,679$  } SEE Q.T. 3<sup>rd</sup> U. Schube.

$$\Delta_2 = 74.128$$

2. 4HV in. PAR.  $\lambda = \left[ \frac{1}{\lambda} + \frac{1}{2\lambda} + \frac{1}{3\lambda} + \frac{1}{4\lambda} \right]^{-1} = 1.192 \quad \Delta_1 = 2.488 \times 4 - 1.192 = 8.74$

$$A_2 = 2.483 \times 8 - 2.382 = 17.482$$

# DES PARALLEL ITEMS (CONT'D)

## 4-1 HEATING & COOLING

$$\Delta_1 = \Delta_{NH}$$

$$\Delta_2 = \Delta_{NH}$$

1. HV in Pipe w. 2HV & CONTR VALVE -  $\Delta_1 = 21.51 \times 10^{-6}$   
 $\Delta_2 = 49.613$

## 2. SEVERAL AREA HEATING

NH (2HV + FAN + HEAT CON + TEMP CONTROLLER) 3 IN PARALLEL  
 $2 \times 1.766 + 1.229 + 1.206 + 1.242 + 15.880 = 23.089$   $23.089 \times \frac{1}{3} = 12.594$   
 $\Delta_1 = 23.089 \times 3 = 12.594$   
 $= 56.7$

NH (2HV + FAN + MOT + HEAT CON + TEMP CONTROLLER) 2 IN PARALLEL  
 $2 \times 1.766 + 3.677 + 15.880 = 23.089$   $23.089 \times \frac{2}{3} = 15.393$   
 $\Delta_1 = 23.089 \times 2 = 15.393$   $= 30.785$   
 $\Delta_2 = 79.1905 \times 3 = 43.195$   $\frac{6}{11} \times 79.1905 = 43.195$

## 3. RETENTION TANK AREA HEATING

NH (2HV + FAN + MOT + HEAT CON + TEMP CONTROLLER) 2 IN PARALLEL  
 $(2 \times 1.766 + 3.677 + 15.880) = 23.089$   $23.089 \times \frac{2}{3} = 15.393$   
 $\Delta_1 = 23.089 \times 2 = 15.393$   $= 30.785$   
 $\Delta_2 = 79.19 \times 2 = 52.794 = 105.6$

## 4. DEAC ENRIELED

NH (2HV + FAN + MOT + COILING CON) 2 IN PARALLEL  
 $(2 \times 1.766 + 3.677) = 7.209$   $7.209 \times \frac{2}{3} = 4.806$   $\Delta_1 = 7.209 \times 2 = 14.418$   $= 29.4$

NH (2HV + FAN + MOT + COILING CON)  $22.020 \times \frac{2}{3} = 14.68$   $22.02 \times 2 = 44.04$   $= 29.4$

HEATING & COOLING  $\Delta A = 21.5 + 56.7 + 30.8 + 0.1 = 110.1$



30

DFS for 12 items

4-10 misc. items

$\{F_{12} \text{ on comp} + 1107 \text{ misc.} + 13,264 \text{ (Net 12 items 2nd part in sequence)}\}$   
 $12,058 + 1,206 = 13,264 \quad \frac{2}{3} \times 13,264 = 9,843 \quad A_1 = 13,264 \times 2 = 26,528 = 17,535$   
 $11A_m \quad 12,058 \times 5 + 1,206 \times 9 = 69,938 = 46,625 \quad A_2 = 69,938 \times 2 = 139,876 = 93,251$

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #5 METAL PARTS FURNACE (MFF)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA TM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	—	—	—	—	—
Rocket, 115mm, M55	VX	Comp B	M28	—	—	—	—	—
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	420.3	220.2	305.5	8.77	1.2
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None	7	7	7	7	
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	—	—	—	—	—
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	450.3		37.592		
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6					

\*MUNITION DEMILITARIZATION PROCESS FLOW

## 01

COPIES DESTROYED: 10 METAL PARTS FORMING (MFP)

9

SUPPLEMENTAL DATA

BUILDING BLOCK

# 5 METAL PAR.

FURNACE (MPF) \_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

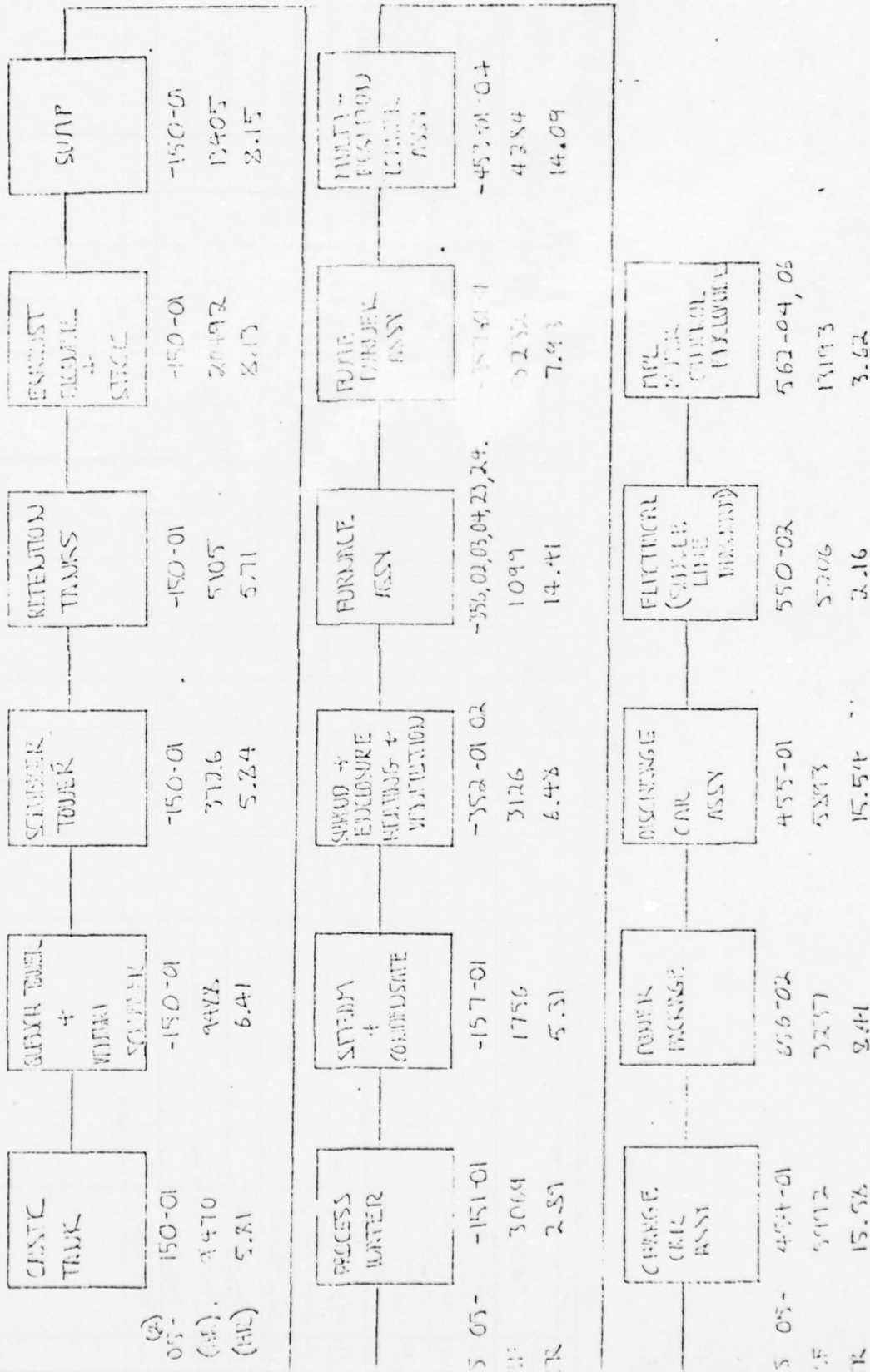
- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available

## D. GENERAL REMARKS

# BUILDING BLOCK: #5 METAL PARTS FURNACE (MPF)

## FLOW CHART



NOTES: (1) CRACK TRUCK CONSIDERED IN CRACK - NOT BUILDING



11-14-75

SHEET 1 OF 13

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

ALP Control Systems - Use Syst For DES Except [Signature] The Following Items

BUILDING BLOCK #5 METAL PARTS FURNACE (MEP)

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (*)	RATE (X10 <sup>-6</sup> /HR)	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
									NA	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NX TM (X10 <sup>-6</sup> )	SOURCE (*)	
1.1	Hand Valve				10	a	2	2.055		P45	0.5	1.0	0.5	2.0		P45	Value checked ok
1.2	Close Assembly				3	a	2	16.515		P41	0.5	1.4	0.5	2.5		P41	Value checked ok
1.3	Tank				1	"	2	3.015		P34	0.5	12.5	1.0	14.0		P34	Value checked ok
1.4	Level Gauge				1	"	3	11.425	NA	P35	0.5	1	0.5	2	NA	P35	
1.5	Level Indicator				1	"	2	11.405		P35	0.5	1	0.5	2		P35	Value checked ok
1.6	Level Alarm				1	"	2	3.742		P35	0.5	1	0.5	2		P35	Value checked ok
1.7	Temp. Indicator				1	"	3		NA						NA		
1.8	Pump Indicator				1	"	3		NA						NA		Pump checked ok
1.9	Pump				1	"	2	12.055		P30	0.5	3.5	1.0	5.0		P30	Value checked ok
1.10	Indicator for Pump				1	"	2	1.24		P34	0.5	2	0.5	3		P34	Value checked ok
1.11	Check valve				3	"	2	3.04		P41	0.5	1.0	0.5	2.0		P41	Value checked ok

2. ECD105-150-01 b. See Comments From Mfg. plant

\*Information is detailed in Supplemental Data Sheet

\*\*Fai Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

$$MTBF = \frac{1}{\sum \frac{1}{MTBF_i}} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{\sum \frac{1}{MTTR_i}} \times 10^6 \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

## BUILDING BLOCK #5 METAL PARTS FURNACE

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Pressure Water

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA /X					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N:M (X10 <sup>-6</sup> )	SOURCE (*)			
2.1	Hand Valve	Isolate	—	—	33	Q-9	2	1/26	P25	NA	0.5	1.0	0.5	2	—	P25	valve 20 yrs old		
2.2	"	"	—	—	7	"	3	—	—	NA	—	—	—	—	NA	—	Valve Control Backup		
2.3	Valve	Control Valve	see 209	—	9	"	2	16/55	P41	—	0.5	1.4	0.5	2.4	—	P41	—		
2.4	Valve	Control Valve	see 209	—	3	"	2	16/55	P41	—	0.5	1.4	0.5	2.4	—	P41	—		
2.5	Temp	Feed Temperature Indicator	71, 72, 73, 74, 75, 76, 77	—	6	"	3	—	—	NA	—	—	—	—	NA	—	—		
2.6	Pressure	Feed Pressure Indicator	—	—	2	"	3	—	—	NA	—	—	—	—	NA	—	Feed Temp. 20 yrs old		
2.7	Temperature	Temperature Indicator	72, 73, 74, 75, 76, 77	—	2	"	2	15/10	P36	—	0.5	2	1	3.5	—	P36	Temp 20 yrs old		
2.8	Pressure	Pressure Indicator	72, 73, 74, 75, 76, 77	—	1	"	2	3/45	P20	—	0.5	1.5	1	3	—	P20	Pressure 20 yrs old		
2.9	Pressure	Pressure Indicator	72, 73, 74, 75, 76, 77	—	2	"	2	1/45	P36	—	0.5	1	0.5	2	—	P36	Valve 20 yrs old		
2.10	Control Valve	Valve	—	—	2	"	2	3/45	P41	—	0.5	1	0.5	2	—	P41	Valve 20 yrs old		
2.11	Control Valve	Valve	72, 73, 74, 75, 76, 77	—	2	"	2	11/45	P35	—	0.5	1	0.5	2	—	P35	Valve 20 yrs old		
2.12	Control Valve	Valve	72, 73, 74, 75, 76, 77	—	1	"	1	—	—	NA	—	—	—	—	NA	—	Valve 20 yrs old		
2.13	Pump	Control Valve	72, 73, 74, 75, 76, 77	—	2	"	2	12/45	P30	—	0.5	3.5	1	5	—	P30	Pump 20 yrs old		
2.14	Valve	Control Valve	72, 73, 74, 75, 76, 77	—	2	"	2	1/20	P35	—	0.5	2	0.5	3	—	P35	Valve 20 yrs old		
2.15	Flow Rate	Flow Rate Indicator	72, 73, 74, 75, 76, 77	—	3	"	2	1/18	P37	—	0.5	1.6	0.5	2.6	—	P37	Flow Rate 20 yrs old		
2.16	Valve	Valve	72, 73, 74, 75, 76, 77	—	1	"	2	1/24	P34	—	0.5	3.2	0.5	4.2	—	P34	Valve 20 yrs old		
2.17	Flow Rate	Flow Rate Indicator	72, 73, 74, 75, 76, 77	—	1	"	2	2/31	P31	—	0.5	3.6	0.5	4.6	—	P31	Flow Rate 20 yrs old		

a. EX-05-151- b. See Appendix F for details

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

$$MTBF = \frac{1}{\text{ENATM}} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{\text{ENATM}} \times 10^6 \text{ HRS}$$

$$\text{AVAILABILITY} = \frac{1}{1 + \text{MTTR} \times 100\%} \times 100\%$$

BUILDING BLOCK #5 METAL PARTS FURNACE (MPT)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Pieces Water (Cont.)

DESCRIPTION										FAILURE DATA			MAINTAINABILITY DATA / X					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	N.A.T.M. (X10 <sup>-6</sup> )	SOURCE (*)		
2.17	Tank	Emergency Towels water tank	-	-	1	Q-001	2	1.616	P31		0.5	12.5	1.0	14		P31	Tank near 3rd grid	
2.18	Alkum	Tank level Alkum	2.18	-	1	"	2	3.74	P35		0.5	1	0.5	2		P35	Tank near 3rd grid	
2.19	Tank	Cooling water tank	D-622	-	1	"	2	1.616	P31		0.5	12.5	1	14		P31	Tank near 3rd grid	
2.20	Water Drift		D-623	-	1	"	2	3.035	P31		0.5	12.5	1	14		P31	Tank near 3rd grid	
2.21	filler		-	-	2	"	2	2.987	P31		0.5	14	0.5	2.8		P31	filler 4th grid	
47																		

a 240000-157-  
 b See Cause File of 11/11/11  
 \* Information is detailed in Supplemental Data Sheet  
 \*\*F01 Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 MTBF =  $\frac{1}{\sum \frac{1}{MTBF_i}}$  HRS  
 ENA =  $\frac{1}{\sum \frac{1}{MTBF_i}}$  HRS  
 INATM =  $\frac{1}{\sum \frac{1}{MTBF_i}}$  HRS  
 MTR =  $\frac{1}{\sum \frac{1}{MTBF_i}}$  HRS  
 AVAILABILITY =  $\frac{1}{1 + MTR} \times 100\%$

## BUILDING BLOCK #5 METAL PARTS FURNACE

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Steam and Condensate

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA / X					REMARKS				
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	DATE (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)
3.1	Steam Valve (V)	Steam	-	-	6.6	18.01	2	1.166	P15	-	0.5	1	0.5	2		P15	Steam Valve from grid.
3.2	"	"	-	-	2.1	"	3	-	-	NA					NA		
3.3	Check Valve	"	-	-	3.0	"	2	3.014	P11		0.5	1	0.5	2		P11	Steam Check Valve
3.4	Control Valve	"	-	-	1.0	"	2	16.515	P11		0.5	1.4	0.5	2.4		P11	Steam Control Valve
3.5	Heater	"	-	-	1.6	"	1	1.242	P14		0.5	3.2	0.5	4.2		P14	Steam Heater for grid
3.6	fan for 1	"	-	-	1.8	"	2	2.318	P13		0.5	3.6	0.5	4.6		P13	fan for grid
3.7	Heater for 1	"	-	-	1.8	"	2	1.206	P15		0.5	2	0.5	3		P15	Heater for grid
3.8	Control Valve	"	-	-	2.4	"	2	4.328	P13		1	7	1	9		P13	Control Valve for grid
3.9	flow meter	"	-	-	3	"	2	2.481	P10		0.5	1.5	1	3		P10	flow meter for grid
3.10	Pressure sensor	"	-	-	13	"	1	-	-	NA					NA		
3.11	Temp sensor	"	-	-	2	"	3	-	-	NA					NA		
3.12	Pressure Valve	"	-	-	2	"	2	3.415	P10		0.5	1.5	1	3		P10	Pressure Valve for grid.
3.13	Pressure control	"	-	-	2	"	2	2.085	P10		0.5	1	0.5	2		P10	Pressure control for grid

$$ENR = \frac{1}{MTBF} \times 10^6 / \text{HR} \quad ENR = \frac{1}{MTTR} \times 100\% \quad ENR = \frac{1}{MTTR} \times 10^6$$

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure



14-17-75

SHEET 5 OF 13

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

SHUTDOWN HEATING & VENTILATING

BUILDING BLOCK #5 METAL PARTS TURNICE (PPT)

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/\text{HR}$	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	
41	Switch	Pressure Switch	4400000	-	5	2-01 4-10-75	2	2.045	P20	0.5	1	.5	2	P20
42	Motorized Damper	Radious Sides - Control Air Flow	See DWG for Ea	-	5	"	2	2.511	See Manual	0.5	2	.5	3	EST
43	Filter	Air Filter	4400000	-	20	"	2	1.201	P21	0.5	1	.5	2	P21
44	Heater	Duct Heater Strm Coil	4400000	-	3	"	2	2.374	P24	0.5	3.2	0.5	4.2	P24
5.1	Exhaust Heater	Exhaust Ventilation Fan												
5.1	Raw Layer				1	2-01 4-10-75	3		N/A					
5.2	Fan	Ventilation Fan		-	2	"	2	2.318	P17	0.5	3.6	0.5	4.6	P17
5.3	Motor	Motor for Fan 1/3 HP		-	2	"	2	7.552	P18	0.5	1.0	0.5	2	P18
5.4	Air Compressor			-	2	"	2	8.058	See Manual	0.5	3	0.5	4	EST
5.5	Transistor			-	11	"	2	4.335	P32	1	7	1	9	P32
5.6	Heater	Strm Heater Motor Coil		-	19	"	2	8.053	See Manual	0.5	3	0.5	4	EST

A. E. DOSAS-352 -

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

INA =  $\frac{1}{\lambda} \times 10^{-6} / \text{HR}$  ENATM =  $\frac{1}{\lambda} \times 10^{-6}$

MTBF =  $\frac{1}{\lambda}$  HRS

MTR =  $\frac{\text{ENATM}}{\text{INA}}$

AVAILABILITY =  $\frac{1}{1 + \text{MTR} \times 100\%}$



11-17-71

SHEET 6 OF 13

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #5 METAL PARTS FURNACE (BPF)

DESCRIPTION										FAILURE DATA			MAINTAINABILITY DATA 1/X					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda \times 10^{-6}/\text{HR}$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NATM (X10-6)	SOURCE (*)		
-6.1	PUNCH CHARACTER ASSY	SENSE WHEN FLOW HIGH	720-44-11	-	2	4-13-71	2	3.742	P15		0.5	1	0.5	2		P15	2nd year 1971	
-6.2	Hose	1/4" Hose - Acquit Exit Floor Pump Area	-	-	2	"	2	.210	P24		0.5	1	0.5	2		P24	2nd year 1971	
-6.3	HYD. CYLINDER	ACTUATOR (HORIZONTAL)	-	-	1	"	2	15.225	P15		0.5	2.5	1.0	4		P15	2nd year 1971	
-6.4	SWITCH	LIMIT SWITCH ON PUNCH	LSA1A	9944	9	"	2	1.133	P17		0.5	1.6	0.5	2.6		P17	2nd year 1971	
-6.5	CONTRACT	BUTYL RUBBER GASKET SEAL	-B20S-1106	-	4	"	2	2.178	P12		0.5	6	0.5	7		P12	2nd year 1971	
-6.6	STUFFING BOX	SEAL ASSY	122087	-	2	"	2	2.178	P12		0.5	6	0.5	7		P12	2nd year 1971	
-6.7	Door ASSY	PUNCH CHARGE DOOR ASSY	-1501	-	1	"	2	31.916	P16		0.5	5	0.5	6		P16	2nd year 1971	
-6.8	Roll ASSY	PUNCH ROLL ASSY	-1401	-	16	"	2	.586	P16		0.5	7	0.5	8		P16	2nd year 1971	
-6.9	ELEVATOR	PUNCH LOWER BASE BLOCKS	-0601	-	1	"	2	2.0	P16		0.5	7	0.5	8		P16	2nd year 1971	
-6.10	PUNCH ASSY	HYD PUNCH ACTUATOR	-0501	-	2	"	2	2.141	P16		0.5	10	0.5	11		P16	2nd year 1971	

Q ELOSOS-352 -

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure

$MTBF = \frac{1}{\sum \frac{1}{MTBF_i}}$ 
 $MTTR = \frac{1}{\sum \frac{1}{MTTR_i}}$ 
 $ENR = \frac{1}{\sum \frac{1}{ENR_i}}$ 
 $ENR = \frac{1}{\sum \frac{1}{ENR_i}} \times 10^{-6}$ 
 $MTTR = \frac{1}{\sum \frac{1}{MTTR_i}}$ 
 $ENR = \frac{1}{\sum \frac{1}{ENR_i}}$ 
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF} \times 100\%}$

11-17-71

SHEET 7 OF 13

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCKS METAL PARTS FURNACE (MPT)

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA /K				REMARKS
							FAIL. CONSEQ. (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	
71	CHARGE CHARGE ASSY	16 LIMIT & CONTROL T.C.	-	9161	2	2-03 9-11-55	2	62.224	P39	0.5	1	0.5	2	P39
72	SWITCH	LIMIT SWITCH ASSY	-2001	-	2	"	2	1.133	P37	0.5	1.6	0.5	2.6	P37
73	DOOR ASSY	DOOR CHARGE & BURNOUT DOOR ASSY	-1601 -1701	-	2	"	2	33.271	See P39	0.5	5	0.5	6	EST
74	BURNER		M402070 2-01-0412 1301, 1001	60512	8	"	2	6.465	P34	0.5	1.5	0.5	2.5	P34
75	ROLL ASSY	CHARGE ROLLER	1301, 1001	-	16	"	2	0.506	P16	0.5	7	0.5	8	P16
51	BURNER	CHARGE ASSY												
81	CHARGE	16 LIMIT & CONTROL T.C.		98164	2	2-04 9-16-75	2	62.224	P39	0.5	1	0.5	2	P39
82	SWITCH	LIMIT SWITCH ASSY	-2001	-	2	"	2	1.133	P37	0.5	1.6	0.5	2.6	P37
83	BURNER		M402070 2-01-0412 1301, 1001	60512	4	"	2	6.465	P34	0.5	1.5	0.5	2.5	P34
84	ROLL ASSY		1301, 1001	-	16	"	2	0.506	P16	0.5	7	0.5	8	P16
85	DOOR ASSY	"BURNER DISCHARGE DOOR"	-1601	-	1	"	2	33.271	EST 5-7-73	0.5	5	0.5	6	EST

a. ECD105-352 Pipe red filler  
 b. See OMS Form 100  
 \*Information is detailed in Supplemental Data Sheet  
 \*\*Est Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Production Line Shutdown Failure  
 MTBF =  $\frac{1}{\lambda}$  HRS    ENA =  $\lambda \times 10^{-6}/HR$     ENATM =  $\lambda \times 10^{-6}$   
 MTR =  $\frac{1}{\lambda}$  HRS    MTR =  $\frac{ENATM}{EN}$     MTR =  $\frac{ENATM}{EN}$  HRS  
 AVAILABILITY =  $\frac{1}{1 + MTR \times 100\%}$

11-17-85

SHEET 8 OF 13  
BUILDING BLOCK #5 METAL PARTS FURNACE  
(MFF)

EQUIPMENT INFORMATION AND FAILURE / MAINTAINABILITY DATA

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA 1/				REMARKS
							FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	
									NA					
41	MOTOR	Drive Motor 1HP w/ integral Brake		01411	1	4-23 9-23-85	2	7.552	P16	0.5	1	0.5	2	Motor 1HP 600 m
42	BEARING	Misc BEARING		71116	6	"	"	0.476	P16	0.5	4	0.5	5	SEMI-ROLL COO
43	CHAIN	DRIVE CHAIN		71116	3	"	4	5.631	P27	0.5	3	0.5	4	For 11242 m
43	SHOVEL			71116	2	"	2	31.247	P28	0.5	2.5	0.5	3.5	Shovel 920 m
44	SUPER			53101 53103	3	"	2	1.231	P28	0.5	3	0.5	4	Super 920
45	SEPARATOR			71116	4	"	2	2.448	P28	0.5	0.5	0.5	3.5	Separator 920 m
46	REDUCER	5:1 100%		53100 53102	2	"	2	11.716	P27	0.5	4.5	1	6	Reducer 920 m
47	MISC DISK DRIVE			71151	1	"	2	4.622	P27	0.5	2.5	0.5	3.5	Computer 920
48	CURRUM	ESER. CURRUM ASSY		1527642 58500	1	"	2	7.535	P27	0.5	3	0.5	4	Current 920 m
49	V-BELTS			30335 71116	2	"	2	4.007	P27	0.5	2	0.5	3	V-Belt 620
	FURNACE	DRIVE SUB ASSY												
101	ALUMINUM	1HP		01411	1	4-23 9-23-85	2	7.552	P16	0.5	1	0.5	2	Motor 1HP 600 m
101	CHAIN			71116	4	"	2	5.634	P27	0.5	3	0.5	4	For 11242 m
101	V-BELTS			"	2	"	2	4.007	P27	0.5	2	0.5	3	V-Belt 620
101	SHOVEL			"	2	"	2	31.247	P28	0.5	2.5	0.5	3.5	Shovel 920 m
101	DRIVE SUB			"	8	"	2	0.446	P16	0.5	4	0.5	5	Drive Sub 920

a. ECOS 65-338- b. See CHSOS Fig 11 of follow

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure

3 - Minor Failure (Failure does not affect production)

$MTBF = \frac{1}{\lambda}$  HRS  
 $MTTR = \frac{1}{\lambda}$  HRS  
 $INM = \frac{1}{\lambda} \times 10^{-6}/HR$   
 $ENM = \frac{1}{\lambda} \times 10^{-6}$   
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF} \times 100\%}$

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Finance Office Sub Assy Bureau

BUILDING BLOCK #5 METAL PARTS FURNACE  
(MPF)

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA				MAINTAINABILITY DATA						REMARKS
							FAIL CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	NA TM ( $\times 10^{-6}$ )	SOURCE (*)	
06	SHUTTER		3201 3202 3203	—	3	4-24 7-11, 10	2	1237	P16		0.5	3	0.5	4		ESR	Shutter good
07	STAMPERS		71176	71176	4	"	2	2452	P16		0.5	2.5	0.5	3.5		ESR	Shutter good
08	REDUCER		55700	55700	2	"	2	11726	P17		0.5	4.5	1	6		P17	Good copy good
09	ALCOHOL DISPENSER		74371	74371	1	"	2	4662	P17		0.5	2.5	0.5	3.5		ESR	Breathing good
10	CLUTCH	ELEC. CLUTCH ASSY	152764-2 5-2	53598	2	"	2	7585	P17		0.5	3	0.5	4		ESR	Clutch Assy Good
11	VALVE	FUME BURNER ASSY															
12	VALVE	6" JAMESBURY AREA AIR(?)	CAT DISMANTLED	—	1	4-01 8-475	2	10781	P45		0.5	3	0.5	4		ESR	Valve pressure OK air/gas
13	FUME ADJUSTOR		AS846	—	1	"	2	2334	P10		0.5	3	0.5	4		ESR	Need exchange spin good
14	BURNER		4-01-058-2	65530	4	4-02 -04	2	6,465	P14		0.5	1.5	0.5	2.5		P14	Exchanger OK/gas
15	THERMOCouple		—	—	4	4-02 -05 -08 -10	2	62224	P17		0.5	1	0.5	2		P18	72 gas good
16	VALVE	TYPE T VALVE ID 3, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		GRACO DIST TAP	2	4-10 9-11	2	10781	P15		0.5	3	0.5	4		ESR	Valve pressure OK air/gas

d. 60505-356-

• Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - trophic failure

2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Mo

4 - See Supplemental Data Sheet



## BUILDING BLOCK #5 METAL PARTS FURNACE (PPT)

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #5 METAL PARTS FURNACE																	
BUILDING BLOCK #5 METAL PARTS FURNACE																	
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS			
							FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT TIME (HR)	N A TM (X10 <sup>-6</sup> )	SOURCE (*)
12.1	Hose Assy				3	4-01 9-16-77	2	2.4	P14		0.5	1	0.5	2		P14	from gen. prod.
12.2	Clutch		400H01		1	"	2	7.515	P17		0.5	3	0.5	4		E37	Clutch Assy gen. prod.
12.3	Pressure Switch	8' Linear Switch	5345-5-350		3	"	2	1.133	P17		0.5	1.6	0.5	2.6		P17	from gen. prod.
12.4	Pressure Valve		0516-37		1	"	2	1.272	P14		0.5	1.5	0.5	2.5		P14	from gen. prod.
12.5	Pressure/Fuel Valve	8' BSC/Manual/Lug			2	"	2	5.136	P14		0.5	3	0.5	4		E37	from gen. prod.
12.6	Pressure Valve		4124-1-300		1	"	2	3.742	P15		0.5	1	0.5	2		P15	from gen. prod.
12.7	Pressure Valve				10	"	2	5.614	P17		0.5	3	0.5	4		E37	from gen. prod.
12.8	Pressure Valve				12	"	2	2.472	P14		0.5	2.5	0.5	3.5		E37	from gen. prod.
12.9	Pressure Valve				1	"	2	2.473	P16		0.5	1.5	0.5	2.5		P16	from gen. prod.
12.10	Pressure Valve				1	"	2	1.126	P17		0.5	4.5	1	6		P17	from gen. prod.
12.11	Pressure Valve				11	"	2	504	P16		0.5	7	0.5	8		P16	from gen. prod.
12.12	Pressure Valve		LSA-7-A-20		5	4-01 9-16-77	2	1.133	P17		0.5	1.6	0.5	2.6		P17	from gen. prod.
12.13	Pressure Valve		5544-1-200		3	4-01 9-16-77	2	15.216	P15		0.5	2.5	1.0	4		P15	from gen. prod.
12.14	Pressure Valve		115-25-0 100		2	4-01 9-16-77	2	1.324	P17		1.0	1.5	.5	3		P17	from gen. prod.
12.15	Pressure Valve				3	"	2	4.007	P17		0.5	2	0.5	3		E37	from gen. prod.
12.16	Pressure Valve				8	"	2	2.472	P16		0.5	2.5	0.5	3.5		E37	from gen. prod.
12.17	Pressure Valve				1	"	2	5.631	P17		0.5	3	0.5	4		E37	from gen. prod.

2.4E05-453-

IN3 = X 10<sup>-6</sup>/HR EN3M = 10<sup>6</sup>

Q. EUG. 05-455-

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure

ENATM =  $\frac{ENATM}{ENATM} \times 10^{-6}$ ENATM =  $\frac{ENATM}{ENATM} \times 10^{-6}$ MTBF =  $\frac{1}{ENATM} \times 10^6$  HRSMTTR =  $\frac{1}{ENATM} \times 10^6$  HRSMTTR =  $\frac{1}{ENATM} \times 10^6$  HRSMTTR =  $\frac{1}{ENATM} \times 10^6$  HRSMTTR =  $\frac{1}{ENATM} \times 10^6$  HRSAVAILABILITY =  $\frac{1}{1 + MTTR \times 1000} \times 100\%$

## BUILDING BLOCK #5 METAL PARTS FURNACE

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA / X				REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE (X 10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	N A TH (X 10 <sup>-6</sup> )
131 Speed Governor	ON/OFF	-	-	1	2-00	2	11.126	P27		0.5	4.5	1	6	P21	Handwritten good
132 Spillcock Valve	ON/OFF	-	-	2	2-00	2	2.80	P26		0.5	7	0.5	8	P21	Handwritten better good
133 Spillcock	ON/OFF	-	-	16	2-00	2	2.412	P28		0.5	2.5	0.5	3.5	P28	Handwritten good
134 Benzene	ON/OFF	-	-	35	"	2	2.20	P21		0.5	7	0.5	8	P21	Handwritten good
135 Limb Switch	ON/OFF	-	-	7	"	2	1.133	P37		0.5	16	0.5	2.6	P37	Handwritten good
136 Switch	ON/OFF	-	-	2	"	2	1.257	P29		0.5	3	0.5	4	P29	Handwritten good
137 Reducer	ON/OFF	-	-	14	"	2	5.634	P27		0.5	3	0.5	4	P27	Handwritten good
138 Valve	ON/OFF	-	-	2	"	2	11.726	P21		0.5	4.5	1	6	P21	Handwritten better good
139 Power Storage	ON/OFF	-	-	13	"	2	3.80	P26		0.5	7	0.5	8	P26	Handwritten good
140 Press Switch	ON/OFF	73510120	61481	1	2-00	2	1.095	P26		0.5	1	0.5	2	P26	Handwritten good
141 Check Valve	ON/OFF	73510120	61481	1	"	2	3.014	P41		0.5	1	0.5	2	P41	Handwritten good
142 Control	ON/OFF	73510120	61481	1	"	2	1.020	P25		0.5	1	0.5	2	P25	Handwritten good
143 Valve	ON/OFF	73510120	61481	2	"	2	1.481	P41		0.5	1	0.5	2	P41	Handwritten good
144 Pump	ON/OFF	73510120	61481	1	"	2	2.857	P20		0.5	1.5	0.5	2.5	P20	Handwritten good
145 Valve	ON/OFF	73510120	61481	8	"	2	16.801	P44		0.5	1	0.5	5	P44	Handwritten good

$$MTDF = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

$$MTBF = \frac{1}{\frac{1}{MTDF} - 1} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{\frac{1}{MTDF} - 1} \times 10^6 \text{ HRS}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

$$MTBF = \frac{1}{\frac{1}{MTDF} - 1} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{\frac{1}{MTDF} - 1} \times 10^6 \text{ HRS}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

11-15

SHEET 12 OF 13

BUILDING BLOCK #5 METAL PARTS FURNACE

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Power Package (over)

ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (S)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
						FAIL CONSEQ (S)	RATE X 10 <sup>-6</sup> /HR	SOURCE (S)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> )	
47	AIR INLET	SEE OIL SHEET		1	2-02	2	2.172	P25	1.0	4	1.0	6.0	SEE OIL SHEET
48	STEAMER	WATER SPRINKLER (FILTER)	2341	1	"	2	2.477	P21	0.5	1.4	0.5	2.4	SEE OIL SHEET
49	VALVE	TEMP CONTROL VALVE BLOW	"	1	"	2	1.238	P32	1	7	1	9	SEE OIL SHEET
40	RECUMULATIVE	3000 PSI 10 GAL	0813	1	"	2	1.471	P24	0.5	3	0.5	4	SEE OIL SHEET
41	VALVE	AIR BLEED	6293	1	"	2	1.514	P41	0.5	1	0.5	2	SEE OIL SHEET
42	FILTER	OIL FILTER 10mm	"	1	"	2	2.287	P21	0.5	1.4	0.5	2.4	SEE OIL SHEET
43	OIL COOLER	SHELL T'NGE	"	1	"	2	1.246	P24	0.5	3.7	0.5	4.2	SEE OIL SHEET
44	POWER UNIT	SEE OIL SHEET		1	"	2	1.167	P21	1.0	15	1.0	17	SEE OIL SHEET
45	DISCHARGE CAR ASSY			2	6-01	2	0.150	P26	0.5	7	0.5	8	SEE OIL SHEET
46	DRIVE TUNING	(ROLLER BEAR.)	"	2	"	2	0.250	P26	0.5	7	0.5	8	SEE OIL SHEET
47	SPRINKLER	MISC LOC.	"	16	"	2	2.016	P28	0.5	2.5	0.5	3.5	SEE OIL SHEET
48	BEARING	"	1482	33	"	2	0.180	P26	0.5	7	0.5	8	SEE OIL SHEET
49	LIMIT SWITCH	"	9229	9	"	2	1.133	P27	0.6	16	0.5	2.6	SEE OIL SHEET
50	DRIFT	"	"	2	"	2	1.237	P28	0.5	3	0.5	4	SEE OIL SHEET
51	CHAM	"	7116	14	"	2	5.484	P27	0.5	3	0.5	4	SEE OIL SHEET
52	REDUCER	INT. BRACE 1 HP MOTOR	5320	2	"	2	1.176	P27	0.5	4.5	1	6	SEE OIL SHEET
53	PIPE	W. W. COUPLER (PIPE BEND)	"	13	"	2	0.180	P26	0.5	7	0.5	8	SEE OIL SHEET

INATM =  $\frac{1}{\text{MTBF}} \times 10^{-6} / \text{HR}$

MTBF =  $\frac{1}{\text{INATM}}$  HRS

AVAILABILITY =  $\frac{1}{1 + \text{MTBF} \times 100\%}$

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

11/1/77

SHEET 13 OF 13

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #5 METAL PARTS FURNACE

SINGLE LINE DIAGRAM ABOVE CONTAINS COMMENTS

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA					REMARKS
M NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE X 10 <sup>-6</sup> /HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TM (X 10 <sup>-6</sup> )	SOURCE (*)			
16.1	Switch				30	4.3.15	2	1.133	P37		0.5	1.6	0.5	2.6		P37	Switch good		
16.2	Fuse				24	"	"	2.101	P31		0.5	1	0.5	2		P31	Fuse good		
16.3	Relay				48	"	"	1.66	P33		0.5	1	0.5	2		P33	Relay good		
16.4	Indicator				12	"	2	0.642	P19		0.5	1	0.5	2		P19	Ext Indicator 3/16		
16.5	Transformer				3	5	2	1	E31		0.5	1	0.5	2		E31	no humming		
16.6	Extender				9	1	2	1	E31		0.5	1	0.5	2		E31	Extender good		
16.7	Heater				2	"	2	2.151	P14		0.5	3.2	0.5	4.2		P14	Heater good		
17.1	Motor	Motor Control Extension Pump															Motor Pump OK - 115V		
17.2	Control P. 115V	115V DC Motor Ext. Pump			1	6.04	2	19.518	See Comment		1.0	6	1	8		E31	7.512 + 115V		
17.3	Transformer	115V			1	"	2	3.945	P10		0.5	1	0.5	2		P10	XDR. 115V good		
17.4	Control DC Drive				1	"	2	4.835	P18		0.5	2	0.5	3		P18	Motor 540V good		
17.5	Transformer		600V-250V		2	"	2	1	E31		0.5	1	0.5	2		E31	Ext good		
17.6	Fuse				19	"	2	2.101	P36		0.5	1	0.5	2		P36	Relay good		
17.7	Relay		110V-25V		15	"	2	1.66	P33		0.5	1	0.5	2		P33	2.0V. 115V-115V		
17.8	Motor Switch		115V-250V		2	"	2	1.013	P33		0.5	1	0.5	2		P33	2.0V. 115V-115V		
17.9	Disturbance Switch		115V-250V		1	"	2	1.133	P37		0.5	1.6	0.5	2.6		P37	2.0V. 115V-115V		

a. Failure - 50%  
 b. Repair - 50%  
 \* Information is detailed in Supplemental Data Sheet  
 \*\* Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

MTBF =  $\frac{1}{\text{Failure Rate}}$  =  $\frac{1}{1.133 \times 10^{-6}}$  = 882,623 HRS  
 MTR =  $\frac{1}{\text{Repair Rate}}$  =  $\frac{1}{1.6 \times 10^{-6}}$  = 625,000 HRS  
 INMT =  $\frac{\text{MTBF}}{\text{MTR}}$  =  $\frac{882,623}{625,000}$  = 1.412





# MPF Parameter Summary

For A/P Control System, See DFS

5.2

Process Water

1. 2 HV + CONTR V IN PAR W. 1 HV

$$\left. \begin{array}{l} \Delta_1 = 21.5 \times 10^{-6} \\ \Delta_2 = 49.6 \end{array} \right\} \text{SEE D.F.S. Q.T. 6.15.}$$

2. 2 HV + CONTR V + CUR V IN PAR W. SENS

$$\left. \begin{array}{l} \Delta_1 = 36.679 \\ \Delta_2 = 74.28 \end{array} \right\} \text{SEE D.F.S. Q.T. 6.15.}$$

$$\Delta_1 = 58.2 \approx \Delta_2 = 123.7$$

5.3

STEAM & CONDENSATES

1. ENCELOSURE HEATER 407

1/2 (2 HV + CUR V + STR CUR + FAN + MTR + TEMP CONTROLLER)

$$2 \times 1766 + 3.014 + 1.242 + 2.318 + 1.206 + 4.338 = 15.65, \quad X_2^2 = 10.433$$

$$\Delta_1 = 15.65 \times 2 = 31.3$$

N<sub>1</sub> (2 x 1.766 x 2 + 3.014 x 2 + 1.242 x 2 + 2.318 x 2 + 1.206 x 2 + 4.338 x 2) = 71.631,  $X_2^2 = 47.8$

$$\Delta_2 = 71.6 \times 2 = 143.2$$

2. ENCL LTR 413, 414 in PARALLEL 15.25 V<sub>TH</sub> = 8.536  $\Delta_1 = 15.25 \times 2 = 30.5$

$$\Delta_2 = 71.6 \times 2 = 143.2$$

3. ENCL STR 417, 418  $\Delta_1 = 20.8, \Delta_2 = 45.6$

4. 2 HV + CONTR V IN PAR W. 1 HV  $\Delta_1 = 21.5, \Delta_2 = 49.6$

5. MPF SIMOND LTR 419 2 HTR 1016 IN PAR 1.242 x 2 = 0.828  $\Delta_1 = 1.242 \times 2 = 0.828$

$$\Delta_2 = 1.242 \times 4.6 \times 2 = 11.57$$

$$\Delta_1 = 123.6$$

$$\Delta_2 = 423.7$$

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #6 ROCKET DEMIL MACHINE (RDM)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX								
Rocket, 115mm, M55	GB	Comp B	M28	2654.534	377	3242.532	12.30	.96
Rocket, 115mm, M55	VX	Comp B	M28	2654.534	377	3242.532	12.30	.96
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121A1	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M122	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 8", M426	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121A1	VX	None	None	N/A	N/A	N/A	N/A	N/A
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	N/A	N/A	N/A	N/A	N/A
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M104	HD	Tetrytol	None	N/A	N/A	N/A	N/A	N/A
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	N/A	N/A	N/A	N/A	N/A
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M5	N/A	N/A	N/A	N/A	N/A
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M5	N/A	N/A	N/A	N/A	N/A

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #6 ROCKET DEMIL MACHINE (RDM)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS,GB/VX								
Bomb,750#,MC-1	GB	None	None	N/A	N/A	N/A	N/A	N/L
Tank,Spray, TMU-28/B	VX	None	None	N/A	N/A	N/A	N/A	N/L
Ton Container	GB	None	None	N/A	N/A	N/A	N/A	N/L
Tone Container	VX	None	None	N/A	N/A	N/A	N/A	N/L
*TON CONTAINER,MUSTARD								
Ton Container	HD	None	None	N/A	N/A	N/A	N/A	N/L

\*MUNITION DEMILITARIZATION PROCESS FLOW



SUPPLEMENTAL DATABUILDING BLOCK  
#6 ROCKET  
DEMIL MACHINE  
(RDM)

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. REFERENCE ATTACHED DATE: \_\_\_\_\_  
LIST
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER DRAFT DEMIL PLAN FOR DATE: AUGUST 1975  
CAMDS VOLUMES 1 AND 2
- d. DISCUSSIONS WITH TEAD (LT. W. SEEGLITZ) 21 OCTOBER 1975

## 2. NOTES \_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER REFERENCE NOTE
- b. OTHER RADC-TR-74-268, FINAL REPORT, OCTOBER 1974, "REVISION OF  
RADC NONELECTRONIC RELIABILITY NOTEBOOK" (RADC-TR-69-459, SE

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCES

- \*(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST DATA  
\*LIMITED SAW BLADE TEST DATA WAS AVAILABLE AND WAS CONSIDERED

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA REFERENCE NOTE
- b. TEAD/EA REFERENCE NOTE
- c. OTHER RADC-TDR-64-373, VOL II FINAL REPORT, DECEMBER 1964,  
"ANALYSIS OF MAINTENANCE TASK TIME DATA"

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCES

- (1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST DATA

## D. GENERAL REMARKS

FIRST SUBMITTAL DATE: 12-1-75 PRELIMINARY COPY OF WORK SHEETS GIVEN TO  
CUSTOMER (R. ROUX) FOR PURPOSES OF DEMONSTRATING METHODOLOGY USED.  
SECOND SUBMITTAL DATE: 12-9-75 PRELIMINARY FOR MSS ROCKET PROCESS FLOW  
PRELIMINARY AVAILABILITY ESTIMATION.  
THIRD SUBMITTAL DATE: 12-30-75

BUILDING BLOCK: #6 ROCKET DEMIL MACHINE (RDM)

DRAWINGS

06-205-02	NOV 7, 1974	06-527-01	OCT 22, 1975
-306-06	JAN 8, 1974	-02	NOV 3, 1975
-07	JAN 8, 1974	-03	NOV 3, 1975
-08	JAN 9, 1974	-04	JUL 19, 1975
-17	JAN 10, 1974	-05	JUL 26, 1975
-19	JAN 15, 1974	-06	JUL 29, 1975
-25	JAN 24, 1974	-07	JUL 21, 1975
-27	MAR 14, 1975	-08	JUL 17, 1975
-28	MAR 24, 1975	-09	OCT 22, 1975
-29	MAY 15, 1975	-10	JUL 18, 1975
-30	APR 8, 1975	-11	JUL 29, 1975
-31 1/4	APR 4, 1975	-12	AUG 15, 1975
-31 2/4	APR 10, 1975	-13	AUG 14, 1975
-32	FEB 1, 1974		
-33	FEB 4, 1974		
-34	JAN 23, 1974		
-35	JAN 25, 1973		
-42	JAN 29, 1974		
-45	JUL 1, 1974		
-46	MAR 14, 1975		
-49	MAR 24, 1975		
-50	JUL 25, 1975		
06-526-1/4	AUG 2, 1972 - REVISION 1 (7/16/74)		
-2/4	AUG 6		
-3/4	AUG 15, 1972		
-4/4	AUG 10, 1972		
-06	APR 10, 1975		

FAILURE RATE FACTORS:

HIGH CYCLIC APPLICATION FACTOR:

	<u>MUNITION PROCESSING RATE (QA)</u>	<u>MUNITION PROCESSING RATE (HR)</u>	<u>FAILURE RATE FACTOR</u>
CONDITION A (BASE)	N/A	N/A	1 (BASE)
CONDITION 1	400	20	2
CONDITION 2	650	32.5	3.25
CONDITION 3	800	40	4
CONDITION 4	1000	50	5

MAINTAINABILITY FACTORS:

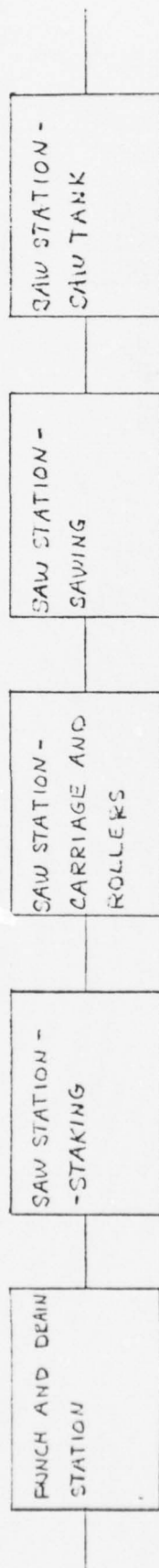
MAINTAINABILITY FACTOR (SUIT REQUIREMENT):

<u>SUIT REQUIREMENT</u>	<u>CONDITION B FACTOR</u>
STREET	1
GLOVES	1.5
MASK AND GLOVES	2
PRESSURIZED SUIT	3

MAINTAINABILITY FACTOR (ACCESSIBILITY/SPACE LIMITATIONS)

<u>ACCESSIBILITY/SPACE LIMITATION</u>	<u>CONDITION C FACTOR</u>
NO LIMITATION	1
LIMITATION	1.33

BUILDING BLOCK NO. 6 - ROCKET DEMIL MACHINE (RDM) FLOW CHART





## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 6

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	HA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)
PUMP AND DRAIN TUNNEL	PUNCH AND DRAIN ROCKET	-	-	2	0812	2	0.100 <sup>Δ</sup>	EST	0.200 <sup>Δ</sup>	-	-	-	20	0.420 <sup>Δ</sup> EST	UNDER TUNNEL AREA SEE #13
PROVIDES LOADING ON PACKING															
PROVIDES AIR TIGHT SEAL DURING DRAINING		1222	71724	2	0813	2	13.396 <sup>Δ</sup>	P22	26.772 <sup>Δ</sup>	-	-	-	20	0.584 <sup>Δ</sup> P118	2.40 <sup>Δ</sup> MTR 100% MTBF
AGENT DRAIN HOSE		-	05004	1	0815	2	0.240	P24	0.440	-	-	-	20	0.460 <sup>Δ</sup> EST	2.40 <sup>Δ</sup> MTR 100% MTBF
PUNCH HOLE IN ROCKET TO DRAIN AGENT		-	-	2	2501	2	2.0	EST	4.0	-	-	-	20	8.0 <sup>Δ</sup> EST	2.40 <sup>Δ</sup> MTR 100% MTBF
PUNCH ACTUATOR		2811H-25-04-100-A	05203	2	3201	2	15.228 <sup>Δ</sup>	P15	30.412 <sup>Δ</sup>	-	-	-	40	24.184 <sup>Δ</sup> P234	2.40 <sup>Δ</sup> MTR 100% MTBF
PUNCH AND DRAIN STATION CLAMP		211H-RF-04-CC	05203	1	3202	2	15.228 <sup>Δ</sup>	P15	15.228 <sup>Δ</sup>	-	-	-	40	60.942 <sup>Δ</sup> P234	2.40 <sup>Δ</sup> MTR 100% MTBF
PRESSURE REGULATES AIR PRESSURE DURING DRAINING		5420R	53471	1	3203	2	2.247 <sup>Δ</sup>	P32	2.247 <sup>Δ</sup>	-	-	-	2.9	4.824 <sup>Δ</sup> P115	2.40 <sup>Δ</sup> MTR 100% MTBF
AIR LINE TO CLAMP AIR PRESS. DRAINING		8210093	04345	1	3204	2	2.407 <sup>Δ</sup>	P42	2.407 <sup>Δ</sup>	-	-	-	2.5	6.010 <sup>Δ</sup> P118	2.40 <sup>Δ</sup> MTR 100% MTBF

$$ENR = \frac{1}{\lambda} \times 10^{-6} \text{ HRS}$$

$$ENR TM = \frac{ENR}{TM} \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

MTR CYCLE ITEM

$$AVAILABILITY = \frac{1}{1 + \frac{MTR}{MTBF}} \times 100\%$$

$$MTBF = \frac{1}{\lambda} \times 10^{-6} \text{ HRS}$$

$$MTR = \frac{ENR TM}{ENR} \times 100\%$$

$$ENR TM = \frac{ENR}{TM} \times 10^{-6}$$

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSLD. (**)	RATE $\lambda$ ( $\times 10^{-6}/HR$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT. TIME (HR)	MATH ( $\times 10^{-6}$ )	SOURCE (*)
AIR LINE AND DRAIN VALVE ASSY	AIR LINE TO CLAMP	-		1	3205	2	0.240	P24	0.240	-	-	-	2.0	0.480	EST	
HYDRA ASSY	HYDRAULIC LINE	3600 SERIES	B5757	2	3215	2	0.240	P24	0.480	-	-	-	2.0	0.960	EST	
HYDRA ASSY	HYDRAULIC LINE	3003 SERIES	B5757	2	3211	2	0.240	P24	0.480	-	-	-	2.0	0.960	EST	
CLAMP (LSC)	PUNCH CLAMP ACTIVATED			1	50	2	1.133	P37	1.133	-	-	-	2.6	2.096	P165	
PUNCH (LST, LSC)	PUNCHES RETRACTED			2	50	2	1.133	P37	2.266	-	-	-	2.6	5.892	P165	
ROCKET DRUM (PSL)	ROCKET DRAINED			1	50	2	2.095	P36	2.095	-	-	-	2.0	4.190	EST	
AGENT TANK FRONT (FSH)	AGENT TANK EMPTY	501	SENAL	1	50	2	1.133	P37	1.133	-	-	-	2.6	2.940	P165	
LOW DRAIN AIR PRESSURE	LOW DRAIN AIR PRESSURE			1	50	2	2.095	P36	2.095	-	-	-	2.0	4.190	EST	
PUNCH BEARING	PUNCH BEARING	S-88-48	99105	2	0814	2	2.180	P23	4.360	-	-	-	2.3	10.028	P234	2 AIRBORNE/45 RESIDUE AND RELEASE: 41 2 INC = 2.3 HR/INC
ROCKET DRAINED	ROCKET DRAINED			1		2	2.095	P36	2.095	-	-	-	2.0	4.190	EST	
ALIVE, 200V 50		8211 026		1	(514) 1,24	2	16.557	P43	16.557	-	-	-	3.3	54.645	P165	2 AIRBORNE/45, RELEASE RESIDUE AND RELEASE: 41 2 INC = 2.3 HR/INC

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

DESCRIPTION					FAILURE DATA					MAINTAINABILITY DATA					TECHNIQUES
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. COSECO (**)	EATE A (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> )	NAM	
WASH AND DRAIN PATTERN (CONT'D)				2		2	NEG	-	-	-	-	-	-	-	-
VENT CATCH TANK		-	-	1	401 - 402	2	NEG	-	-	-	-	-	-	-	-
REAL AGENT TRAINING (ON-SITE) INSTRUCTIONS PSS #1 (200) F-HYDRO															

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• Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. SOURCE (**)	RATE A (X10 <sup>-6</sup> /HR)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL PAINT TIME (HR)	NA TH (X10 <sup>-6</sup> )
START STATION (DAP)	STARTING				(306)									
CYLINDER, HYD	POSITIONING CLAMP ACTUATION	1/8 AN-FF-3	05283	1	3213	2	15.228	P15	15.228	-	-	40	20.912	P224
CYLINDER, HYD	STAKER ACTUATION	2X AN-FF-14	05283	2	3214	2	15.228	P15	-	-	-	40	22.624	P234
VALVE		-	99105	2	0603	2	2.180	P23	-	-	-	2.3	10.028	P234
VALVE		-	-	2	2007	2	NEG	-	-	-	-	-	-	-
VALVE	HOLDS ROCKET FOR STAKING	-	-	2	1910	2	NEG	-	-	-	-	-	-	-

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Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet



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• Information is detailed in Supplemental Data Sheet

Future Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{\frac{1}{ENR}} = \frac{1}{\frac{1}{\text{HRS}}} = \text{HRS}$$

$$ENR = \text{---} \times 10^{-6} / \text{HR}$$

$$ENRMT = \frac{ENRMT}{ENR} = \text{---} \times 10^{-6}$$

$$MTTR = \frac{ENRMT}{ENR} = \text{---}$$

$$AVAILABILITY = \frac{MTTR}{1 + MTTR} \times 100\% = \text{---} \%$$

-information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
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- 4 - See Supplemental Data Sheet

A UPPER 50% CONFIDENCE LEVEL FAILURE RATE OF  $152.24 \times 10^{-6}/\text{Hr}$  ( $\lambda = 152.24 \times 10^{-6}/\text{Hr}$ ) FOR 200,000 HRS OF OPERATION OF 1000 BLADE CYCLES (SECTIONING OF 1000 ROCKETS AT 1000 STATIONS/HOUR) WITH 50% FAILURE RATE ESTIMATES A UPPER 50% CONFIDENCE LEVEL FAILURE RATE OF  $2920.14 \times 10^{-6}/\text{Hr}$  ( $\lambda = 2920.14 \times 10^{-6}/\text{Hr}$ ) FOR 1000 Cycles. THESE FAILURE RATES ARE LIMITED IN APPROPRIATENESS TO THIS ANALYSIS BY THE NUMBER OF TESTS RUN, THE NUMBER OF FAILURES, AND BY THE NON-APPLICABILITY OF THE TESTS TO THE PRODUCTION SITUATION (THROUGH THE TEST PROGRAM IT WAS FOUND THAT A REDUCTION IN CUTTING SPEED REDUCED BLADE BREAKAGE AND EXTENDED BLADE LIFE). BECAUSE OF THESE LIMITATIONS THE (DISCUSSION CONTINUED ON NEXT PAGE)

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- See Supplemental Data Sheet

## EQUIPMENT INFORMATION AND FAILURE MAINTENANCE DATA

## BUILDING BLOCKS FOR EQUIPMENT MAINTENANCE DATA

DESCRIPTION				FAILURE DATA				MAINTENANCE DATA				REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY	THRU. SOURCE (*)	FAIL. LOCUS (**)	DATE X (X10 <sup>-6</sup> HRS)	SOURCE (*)	DIAGN. TIME (HRS)	REPAIR TIME (HRS)	CHECK-OUT TIME (HRS)		N.A.T.N. (X10 <sup>-6</sup> HRS)	SOURCE (*)
SECTION ROCKET			54940	2	4502	2	200.0	EST 1100.0	-	-	2.0	600.0	EST	REM CHAM DATA FOR RATE PATTERNS TO DISCUSS THE DATA HAS ON PAGE 7
73	POWERS SAW		-	4	0205	2	2.412	P28 9.652	-	-	7.6	73.355	EST	74M NTC EST & 74M PMP
74	POWERS SAW		-	2	0221	2	2.415	P28 4.826	-	-	7.6	34.073	EST	74M NTC EST & 74M PMP
75	SAWS UP MONITOR			6	50	2	1.132	P37 6.778	-	-	2.6	17.675	P165	
76	SAWS DOWN MONITOR			6	50	2	1.133	P37 6.798	-	-	2.6	17.675	P165	
77	HOLES SAWS & CARRIAGE UP			3	-	2	3.014	P41 9.042	-	-	2.0	18.057	EST	
78	ELECTRICAL CUMM		74B	30	(526)	2	0.460	P20 13800	-	-	2.0	27.600	EST	

RDM SAW BLADE FAILURE RATE RATIONALE (CONTINUED FROM PREVIOUS PAGE)

DEMONSTRATED FAILURE RATES BASED ON THIS DEVELOPMENT TEST DATA HAVE NOT APPLIED IN THIS CASE WHICH IS INTENDED TO REPRESENT THE MATURE SYSTEM (CONSTANT FAILURE RATE) PRODUCTION PLANT ESTIMATED FAILURE RATES BELIEVED TO BE CONSISTENT WITH THE REDUCED OPERATIONAL PLANT SPEED, PERIODIC MAINTENANCE PLAN (REGULAR SHARPENING WITH A NEWLY PURCHASED SAW BLADE SHARPENING MACHINE), AND MATURE SYSTEM CONSTANT FAILURE RATE USED THROUGHOUT THIS ANALYSIS ARE USED HEREIN. A FAILURE RATE OF 20X10<sup>-6</sup> F/HRS, WHICH REPRESENTS ONE OF THE LARGEST COMPONENT IN (DISCUSSION CONTINUED ON NEXT PAGE)

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCKS FOR THE FUTURE

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						PROGRAMS	
ITEM NAME	FUNCTION	PART NO.	NEG CON NO.	QTY (R)	INFO. SOURCE (*)	FAIL COUNT (**) (X10 <sup>-6</sup> HR)	DATE X (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10 <sup>-6</sup> HR)		R.A.M.
AW STATION (SAW) (1-10) (CONT)															
SAWS (7 SLD)	SECURE ROCKET/ROCKET SEGMENTS			14		2	NEG	-	-	-	-	-	-	-	-
AW STATION (SAW) (ANA)	DECON RESERVOIR														
VMP, LAPPEN	CIRCULATE DECON DURING CUTTING		06428	1	3503	2	4.219	P30	4.219	-	-	-	7.6	32.067	202.195
SSB	DECON PUMP	0124	30527	1	3508	2	0.240	P24	0.240	-	-	-	2.0	0.480	1.57
ALUM, 2 WRS	CONTROL PUMP	8211110	04845	1	3573	2	14.557	P43	16.507	-	-	-	3.3	54.643	166.193

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AW STATION (SAW) (ANA)

VMP, LAPPEN

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ALUM, 2 WRS

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Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

RDM SAWBLADE FAILURE RATE RATIONALE (CONTINUED FROM PREVIOUS PAGE)

EQUIPMENT INFORMATION AND FAILURE/MAINTENANCE DATA

BUILDING BLOCK 204 - SEWAGE TREATMENT PLANT

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. (COUNT) (**)	DATE (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	NA TH (X10 <sup>-6</sup> )	SOURCE (*)	
AIR STATION (SAW) (CONT)																
FLOAT SW FS-13	TANK LEVEL SENSING	501	55044	3	50	3	-	-	-	-	-	-	-	-	-	RED-MAY-1987 FURNISH TO FLOATE PUMP UNIT A - FAILURE ANALYSIS IN PROG.
SLUDGE VALVE CIRCULATE/RAIN POSITION				4	50	2	1.133 <sup>1</sup>	P37	1.133 <sup>2</sup>	-	-	-	2.6	2.945 <sup>1</sup>	F165	
VALVE, SOLENOID POSITION	DECON AIR PUMP			2	50	2	16.559 <sup>1</sup>	P43	33.110 <sup>1</sup>	-	-	-	3.3	10.928 <sup>1</sup>	F165	VALVE/DECON/RT. KENNEL PUMP, 100% NEEDLE: 9.73 HRS./4.4 528, 241, 2.3 HRS/INC 257, 225
TANK	SAW TANK	3101-3110	-	1	31	2	NEG	EST	-	-	-	-	-	-	-	

75

$LN_A = \frac{1}{\text{HRS}} \times 10^{-6} / \text{HR}$ 
 $LN_{ATH} = \frac{1}{\text{HRS}} \times 10^{-6}$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$MTBF = \frac{1}{LN_A} \times \frac{1}{\text{HRS}}$ 
 $MTTR = \frac{1}{LN_{ATH}} \times \frac{1}{\text{HRS}}$

COND	AVAILABILITY	MTTR	MTBF	LN_A	LN_{ATH}	COND	AVAILABILITY	MTTR	MTBF	LN_A	LN_{ATH}
COND 1	377	377	377	377	377	COND 2	377	377	377	377	377
COND 3	377	377	377	377	377	COND 4	377	377	377	377	377

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #8 UTILITIES (UTL)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVAIL ABILI
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	NEG	N/A	NEG	N/A	~1.0
Rocket, 115mm, M55	VX	Comp B	M28	NEG	N/A	NEG	N/A	~1.0
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	4323.373	231	43193.233	9.98	0.956
Projectile, 155mm, M121A1	GB	None	None	2874.761	348	28797.522	10.02	0.972
Projectile, 155mm, M121	GB	None	None	2874.761	348	28797.522	10.02	0.972
Projectile, 155mm, M122	GB	None	None	2874.761	348	28797.522	10.02	0.972
*Projectile, 8", M426	GB	None	None	1836.166	545	18314.833	10.08	0.931
Projectile, 155mm, M121A1	VX	None	None	2874.761	348	28797.522	10.02	0.972
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	4323.373	231	43193.233	9.99	0.956
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	2874.761	348	28797.522	10.02	0.972
Projectile, 155mm, M104	HD	Tetrytol	None	2874.761	348	28797.522	10.02	0.972
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	NEG	N/A	NEG	N/A	~1.0
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	4323.373	231	43193.233	9.98	0.956
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	4323.373	231	43193.233	9.98	0.956

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #8 UTILITIES (UTL)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NATH	MTTR	AVAIL ASIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NEG	N/A	NEG	N/A	≈1.0
Tank, Spray, THU-28/B	VX	None	None	NEG	N/A	NEG	N/A	≈1.0
Ton Container	GB	None	None	NEG	N/A	NEG	N/A	≈1.0
Tone Container	VX	None	None	NEG	N/A	NEG	N/A	≈1.0
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NEG	N/A	NEG	N/A	≈1.0



SUPPLEMENTAL DATA

BUILDING BLOCK

#8.0 UTILITIES (U)

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. TCDS 08-308-02 DATE: 1 MAY 1975  
TCDS 08-217-01 18 APRIL 1975
- b. DOCUMENT NO. CAMDS REPAIR PARTS DATE: 29 AUGUST 1975  
(INVENTORY CONTROL SYSTEM)
- c. OTHER TRW GENERATED FINEM DATE: 2 OCTOBER 1975
- d. DISCUSSION WITH TEAD (T. THOMAS - HYDRAULIC UNIT) 21 OCTOBER 1975
- e. DISCUSSION WITH TEAD (R. SCHNORENBERG - UTILITIES) 21 OCTOBER 1975
2. NOTES UTILITIES DRAWINGS (OTHER THAN THE HYDRAULICS UNIT) LIMITED

IN NUMBER. THIS PREVENTED A COMPONENT LEVEL ANALYSIS (ANAL)  
WAS DONE AT THE MAJOR UNIT LEVEL (EXCEPT THE HYDRAULICS UN

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER SEE NOTE
- b. OTHER RADC-TR-74-268 FINAL REPORT, OCTOBER 1974, "REVISION OF  
NON-ELECTRONIC RELIABILITY NOTEBOOK" (RADC-TR-69-458, SECTION 2

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOUR  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST DA

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

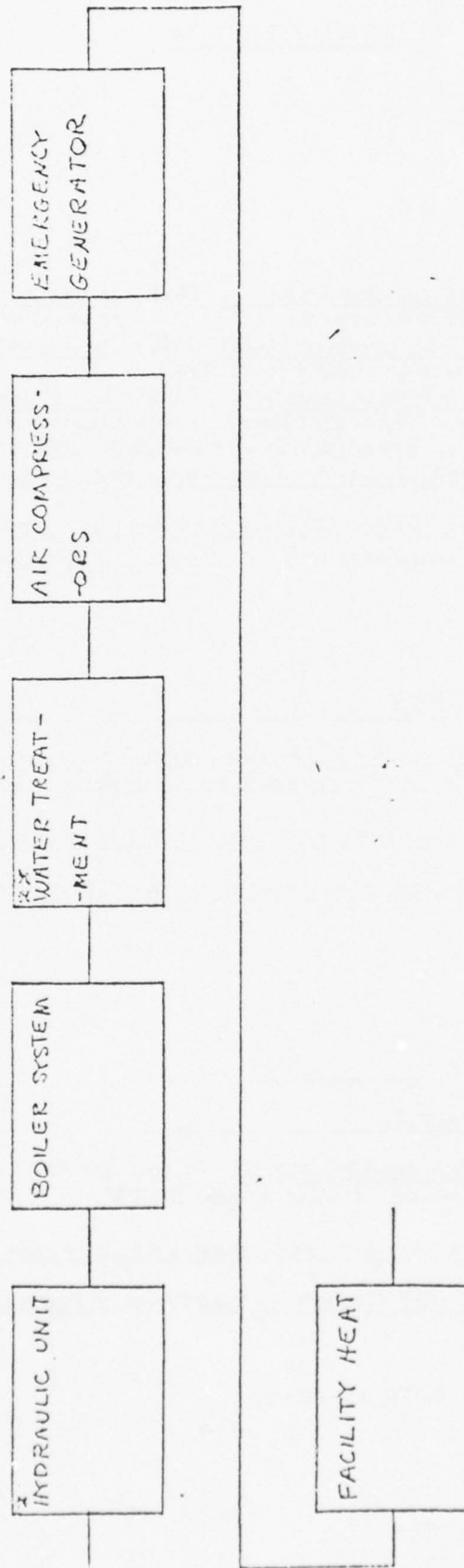
- a. RMA SEE NOTE
- b. TEAD/EA SEE NOTE
- c. OTHER RADC-TOR-64-373 VOL II FINAL REPORT, DECEMBER 1964, "ANAL  
OF MAINTENANCE TASK TIME DATA"

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM TWO PRIME SOURCES:  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST

## D. GENERAL REMARKS

FIRST SUBMITTAL DATE: 1-5-76

BUILDING BLOCK: #8 UTILITIES (UTL) FLOW CHART



\*\*ADDITIONAL WATER SOFTENERS (PRINCIPAL UNIT IS IN THE BOILER SYSTEM) - ONE EACH SERVICING ADS AND MPF REQUIREMENTS.

\*HYDRAULIC UNIT APPLIES TO THE FOLLOWING DEMIL PROCESS FLOWS ONLY: PROJECTILES/CAN RIDGES C/P/1X WITHOUT BUSTERS PROJECTILES/CARTRIDGES C/P/1X WITH BUSTERS PROJECTILES

EQUIPMENT INFORMATION AND FAILURE MAINTAINABILITY DATA

ITEM NAME	FUNCTION	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
		QTY CODE (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE X 10 <sup>-6</sup> /HR	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (UP)	SOURCE (*)

UTILITIES

STATE OF ANALYSIS:

THE UTILITIES BUILDING BLOCK CONSISTS OF THOSE ITEMS OUTLINED ON DRAWING TDS-09-217-01 AND A HYDRAULIC UNIT. DRAWING TDS-09-217-01 LISTS BOILERS #1 AND #2, BOILER CONTROLS, AIR COMPRESSORS #1 AND #2, WATER TREATMENT, EMERGENCY GENERATORS, AND CONTROL PANEL. THESE UNITS HAVE GENERAL APPLICATION TO ALL DEMIL PROCESS FLOWES BUT ARE NOT YET WELL DEFINED AT THE COMPONENT LEVEL. HENCE IT IS NOT POSSIBLE TO DO A COMPONENT BASED AVAILABILITY ANALYSIS BY THIS POINT IN THE UTILITIES BUILDING BLOCK. HOWEVER, FROM DISCUSSIONS WITH TEAD PERSONNEL, IT HAS BEEN DETERMINED THAT THE UNITS HAVE SUFFICIENT REDUNDANCY AT THE UNIT LEVEL THAT A SINGLE FAILURE WOULD LIKELY RESULT IN A FAILURE CONSEQUENCE OF NO MORE THAN CODE #3 (MINOR FAILURE-REPAIR DURING MAINTENANCE PERIOD. THE HYDRAULIC UNIT (MINOR IN CONFIGURATION TO THE ECC HYDRAULIC UNIT) SATISFIES THE HYDRAULIC REQUIREMENTS OF THE PRODUCTION LINE (MINOR IN THE FOLLOWING DEMIL PROCESS FLOWS: PROJECTILES/CARTRIDGES GRVX WITHOUT PROJECTS, PROJECTILES/CARTRIDGES GRVX WITH BURSTERS, PROJECTILES MUSTARD WITH BURSTERS, AND 42M MORTARS MUSTARD. THIS UNIT ALSO SATISFIES THE LIMITED HYDRAULIC REQUIREMENTS OF THE BIF. THE HYDRAULIC UNIT IS WELL DEFINED AT THE COMPONENT LEVEL, HAVING UNIT LEVEL REDUNDANCY, AND IS SUCH THAT A FAILURE WOULD LIKELY RESULT IN A FAILURE CONSEQUENCE OF CODE #2 (PRODUCTION LINE SHUTDOWN FAILURE).

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$ENR = \frac{1}{ENR} \times 10^{-6} / HR$$

$$ENR = \frac{1}{ENR} \times 10^{-6} / HR$$

$$MTBF = \frac{1}{ENR}$$

$$MTTR = \frac{ENR}{ENR}$$

$$HRS$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 5 (TOTAL 10)

ITEM NAME	DESCRIPTION	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
		PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (N)	FAIL CONSEQ. (**)	FAIR RATE (x 10 <sup>-6</sup> /HR)	SOURCE (*)	NA (x 10 <sup>-6</sup> )	
HYDRAULIC UNIT	CONTAINS THE HYDRAULICS CUPING	T-100	22983	1	0214	2	6.623	137	6.623	
PUMP	PUMP INTAKE - FILTERS HYDRAULIC FLUID BEFORE IT IS PUMPED THROUGH THE SYSTEM.	20FC-2F-10	62033	1	0210	2	2.927	121	2.927	
RESERVOIR	RESERVOIR RETURN LINE - FILTERS HYDRAULIC FLUID THAT HAS BEEN PUMPED THROUGH THE SYSTEM.	4PM-2000	62025	1	0211	2	2.927	121	2.927	
RESERVOIR	UPPER AND LOWER RESERVOIR LEVELS - DETECTS LARGE SCALE HYDRAULIC FLUID LOSS.	420-500	54023	2	0216	3	-	-	-	
HYDRAULIC PUMP	CIRCULATES HYDRAULIC FLUID THROUGH THE SYSTEM AT 1000 PSI FROM THE HYDRAULIC PUMP, RESERVOIR THROUGH THE SYSTEM.	FV200-FLSFV-200MG-11	62983	1	0214	2	17.570	131	17.570	

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{\sum \frac{1}{EN}} \times 10^{-6} \text{ HRS}$$

$$MTTR = \frac{1}{\sum \frac{1}{EN}} \times 10^{-6} \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

$$EN = \frac{IN}{EN} \times 10^{-6}$$

$$MTTR = \frac{IN}{EN} \times 10^{-6} \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

## BUILDING BLOCK NO. 8 UTILITIES (UHL)

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA				REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME TS ( $\times 10^{-6}$ )	NA TH SOURCE (*)				
HYDRAULIC PUMP	POWERS THE HYDRAULIC PUMP	-	4203	1	0213	2	1.200	P23	1.200	-	-	-	7.4	0.450	2.4	REMARKS: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 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1167. 1168. 1169. 1170. 1171. 1172. 1173. 1174. 1175. 1176. 1177. 1178. 1179. 1180. 1181. 1182. 1183. 1184. 1185. 1186. 1187. 1188. 1189. 1190. 1191. 1192. 1193. 1194. 1195. 1196. 1197. 1198. 1199. 1200. 1201. 1202. 1203. 1204. 1205. 1206. 1207. 1208. 1209. 1210. 1211. 1212. 1213. 1214. 1215. 1216. 1217. 1218. 1219. 1220. 1221. 1222. 1223. 1224. 1225. 1226. 1227. 1228. 1229. 1230. 1231. 1232. 1233. 1234. 1235. 1236. 1237. 1238. 1239. 1240. 1241. 1242. 1243. 1244. 1245. 1246. 1247. 1248. 1249. 1250. 1251. 1252. 1253. 1254. 1255. 1256. 1257. 1258. 1259. 1260. 1261. 1262. 1263. 1264. 1265. 1266. 1267. 1268. 1269. 1270. 1271. 1272. 1273. 1274. 1275. 1276. 1277. 1278. 1279. 1280. 1281. 1282. 1283. 1284. 1285. 1286. 1287. 1288. 1289. 1290. 1291. 1292. 1293. 1294. 1295. 1296. 1297. 1298. 1299. 1300. 1301. 1302. 1303. 1304. 1305. 1306. 1307. 1308. 1309. 1310. 1311. 1312. 1313. 1314. 1315. 1316. 1317. 1318. 1319. 1320. 1321. 1322. 1323. 1324. 1325. 1326. 1327. 1328. 1329. 1330. 1331. 1332. 1333. 1334. 1335. 1336. 1337. 1338. 1339. 1340. 1341. 1342. 1343. 1344. 1345. 1346. 1347. 1348. 1349. 1350. 1351. 1352. 1353. 1354. 1355. 1356. 1357. 1358. 1359. 1360. 1361. 1362. 1363. 1364. 1365. 1366. 1367. 1368. 1369. 1370. 1371. 1372. 1373. 1374. 1375. 1376. 1377. 1378. 1379. 1380. 1381. 1382. 1383. 1384. 1385. 1386. 1387. 1388. 1389. 1390. 1391. 1392. 1393. 1394. 1395. 1396. 1397. 1398. 1399. 1400. 1401. 1402. 1403. 1404. 1405. 1406. 1407. 1408. 1409. 1410. 1411. 1412. 1413. 1414. 1415. 1416. 1417. 1418. 1419. 1420. 1421. 1422. 1423. 1424. 1425. 1426. 1427. 1428. 1429. 1430. 1431. 1432. 1433. 1434. 1435. 1436. 1437. 1438. 1439. 1440. 1441. 1442. 1443. 1444. 1445. 1446. 1447. 1448. 1449. 1450. 1451. 1452. 1453. 1454. 1455. 1456. 1457. 1458. 1459. 1460. 1461. 1462. 1463. 1464. 1465. 1466. 1467. 1468. 1469. 1470. 1471. 1472. 1473. 1474. 1475. 1476. 1477. 1478. 1479. 1480. 1481. 1482. 1483. 1484. 1485. 1486. 1487. 1488. 1489. 1490. 1491. 1492. 1493. 1494. 1495. 1496. 1497. 1498. 1499. 1500. 1501. 1502. 1503. 1504. 1505. 1506. 1507. 1508. 1509. 1510. 1511. 1512. 1513. 1514. 1515. 1516. 1517. 1518. 1519. 1520. 1521. 1522. 1523. 1524. 1525. 1526. 1527. 1528. 1529. 1530. 1531. 1532. 1533. 1534. 1535. 1536. 1537. 1538. 1539. 1540. 1541. 1542. 1543. 1544. 1545. 1546. 1547. 1548. 1549. 1550. 1551. 1552. 1553. 1554. 1555. 1556. 1557. 1558. 1559. 1560. 1561. 1562. 1563. 1564. 1565. 1566. 1567. 1568. 1569. 1570. 1571. 1572. 1573. 1574. 1575. 1576. 1577. 1578. 1579. 1580. 1581. 1582. 1583. 1584. 1585. 1586. 1587. 1588. 1589. 1590. 1591. 1592. 1593. 1594. 1595. 1596. 1597. 1598. 1599. 1600. 1601. 1602. 1603. 1604. 1605. 1606. 1607. 1608. 1609. 1610. 1611. 1612. 1613. 1614. 1615. 1616. 1617. 1618. 1619. 1620. 1621. 1622. 1623. 1624. 1625. 1626. 1627. 1628. 1629. 1630. 1631. 1632. 1633. 1634. 1635. 1636. 1637. 1638. 1639. 1640. 1641. 1642. 1643. 1644. 1645. 1646. 1647. 1648. 1649. 1650. 1651. 1652. 1653. 1654. 1655. 1656. 1657. 1658. 1659. 1660. 1661. 1662. 1663. 1664. 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2163. 2164. 2165. 2166. 2167. 2168. 2169. 2170. 2171. 2172. 2173. 2174. 2175. 2176. 2177. 2178. 2179. 2180. 2181. 2182. 2183. 2184. 2185. 2186. 2187. 2188. 21		

$$\text{MTBF} = \frac{1}{\text{ENA}} = \frac{1}{\text{HRS}} \quad \text{ENA} = \frac{\text{HNA}}{\text{HRS}} = \frac{\text{HNA}}{\text{HRS}} \times 10^{-6}$$

$$\text{AVAILABILITY} = \frac{1}{1 + \text{MTTR}} \times 100\% = \frac{1}{1 + \text{MTTR}} \times 100\%$$

Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

## BUILDING BLOCK A08 UTILITIES

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS																		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE λ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHG. OUT TIME (HR)	TOTAL MAINT. TIME (HR)	SOURCE (*)															
HYDRAULIC UNIT (CON <sup>4</sup> )																														
HYDRAULIC ASSEMBLY	MAINTAINS A STEADY STATE HIGH PRESSURE OUTPUT FROM THE HYDRAULIC SYSTEM AT VARIOUS LOAD DEMANDS.	14120-2-30-0000	62983	1	0215	2	7.301	PIN	1321				2.5	18330	FROM 1 AND 2 AND 3 AND 4 AND 5 AND 6 AND 7 AND 8 AND 9 AND 10 AND 11 AND 12 AND 13 AND 14 AND 15 AND 16 AND 17 AND 18 AND 19 AND 20 AND 21 AND 22 AND 23 AND 24 AND 25 AND 26 AND 27 AND 28 AND 29 AND 30 AND 31 AND 32 AND 33 AND 34 AND 35 AND 36 AND 37 AND 38 AND 39 AND 40 AND 41 AND 42 AND 43 AND 44 AND 45 AND 46 AND 47 AND 48 AND 49 AND 50 AND 51 AND 52 AND 53 AND 54 AND 55 AND 56 AND 57 AND 58 AND 59 AND 60 AND 61 AND 62 AND 63 AND 64 AND 65 AND 66 AND 67 AND 68 AND 69 AND 70 AND 71 AND 72 AND 73 AND 74 AND 75 AND 76 AND 77 AND 78 AND 79 AND 80 AND 81 AND 82 AND 83 AND 84 AND 85 AND 86 AND 87 AND 88 AND 89 AND 90 AND 91 AND 92 AND 93 AND 94 AND 95 AND 96 AND 97 AND 98 AND 99 AND 100 AND 101 AND 102 AND 103 AND 104 AND 105 AND 106 AND 107 AND 108 AND 109 AND 110 AND 111 AND 112 AND 113 AND 114 AND 115 AND 116 AND 117 AND 118 AND 119 AND 120 AND 121 AND 122 AND 123 AND 124 AND 125 AND 126 AND 127 AND 128 AND 129 AND 130 AND 131 AND 132 AND 133 AND 134 AND 135 AND 136 AND 137 AND 138 AND 139 AND 140 AND 141 AND 142 AND 143 AND 144 AND 145 AND 146 AND 147 AND 148 AND 149 AND 150 AND 151 AND 152 AND 153 AND 154 AND 155 AND 156 AND 157 AND 158 AND 159 AND 160 AND 161 AND 162 AND 163 AND 164 AND 165 AND 166 AND 167 AND 168 AND 169 AND 170 AND 171 AND 172 AND 173 AND 174 AND 175 AND 176 AND 177 AND 178 AND 179 AND 180 AND 181 AND 182 AND 183 AND 184 AND 185 AND 186 AND 187 AND 188 AND 189 AND 190 AND 191 AND 192 AND 193 AND 194 AND 195 AND 196 AND 197 AND 198 AND 199 AND 200 AND 201 AND 202 AND 203 AND 204 AND 205 AND 206 AND 207 AND 208 AND 209 AND 210 AND 211 AND 212 AND 213 AND 214 AND 215 AND 216 AND 217 AND 218 AND 219 AND 220 AND 221 AND 222 AND 223 AND 224 AND 225 AND 226 AND 227 AND 228 AND 229 AND 230 AND 231 AND 232 AND 233 AND 234 AND 235 AND 236 AND 237 AND 238 AND 239 AND 240 AND 241 AND 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992 AND 993 AND 994 AND 995 AND 996 AND 997 AND 998 AND 999 AND 1000															
HYDRAULIC ASSEMBLY	MANUALLY OPERATED VALVES THAT ARE USED TO LOWER THE SYSTEM PRESSURE TO VALVES (AND OPERATING UNITS) IMMEDIATELY DOWNSTREAM.	14120-2-30-0000	62983	2	0203	3																								
HYDRAULIC VALVES	MANUALLY OPERATED VALVES THAT PROVIDE THE CAPABILITY TO INHERIT FLOW IN CERTAIN LINES.	14120-2-30-0000	62983	2	0202	3																								

$$INA = \frac{1}{MTBF} \times 10^{-6} / \text{HR} \quad ENA = \frac{1}{MTBF} \times 10^{-6}$$

$$MTBF = \frac{1}{INA} \times 10^6 \quad \text{HRS} \quad MTR = \frac{ENATM}{ENA} \times 100\% \quad \text{HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTR}{MTBF}} \times 100\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

3

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 2 - UTILITY														
DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA (X10 <sup>-6</sup> )	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	MAINT. TIME (X10 <sup>-6</sup> )
PUMPING UNIT (CONT)														

SUBCULATION FOR MECHANICAL UNIT: NA x 10<sup>-6</sup> HR

A cycle item

is obtained in Supplemental Data Sheet

1. Equipment Code  
 2. Failure  
 3. Failure  
 4. Failure  
 5. Failure  
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 7. Failure  
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EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION															
ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CODE (**)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS	
							RATE (x10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)		NA TH (x10 <sup>-6</sup> )
COOLER SYSTEM. PROVIDES STEAM SUPPLY FOR THE CAMPS FACILITY.		-	-	1	217-01 AND *	3									THE COOLERS ARE 217-01 SUCH THAT THE COOLERS FUNCTION WITH ONLY 2 COOLERS OPERATIVE. COOLERS UNITS OPERATE AT 125 PSI. 0.10 PSI MORE IS 125 PSI.
COOLER UNITS INCLUDE: COOLERS AND 2 COOLERS INCLUDE: REPAIR VALVES, REPAIR VALVES, REPAIR VALVES, ETC)		CLEAVER BROOKS MODEL 600	-	2	*	3									COOL-THINK UNIT, OPERATE AT 5-15 PSI
COOLER	SYSTEM OXYGEN REMOVAL	CLEAVER BROOKS MODEL SM 450	-	1	*	3									TWO UNIT COOLERS MUST OPERATE AT 20 GPM MINIMUM RATE.
WATER SOFTENER SOFTENS WATER		CULLIGAN MODEL MA-450	-	1	*	3									ONE UNIT FOR THE COOLERS A REPAIR VALVE AFTER COOLER.
ELECTROLYSIS REACTOR REMOVES HEAVY LIQUID FROM THE COOLER		CLEAVER BROOKS MODEL AS4B	-	1	*	3									

$IN1 = \frac{1}{EVA} \times 10^{-6} / HR$ 
 $IN1M = \frac{1}{EVA} \times 10^{-6}$

$MTBF = \frac{1}{EVA}$ 
 $MTTR = \frac{1}{EVA}$ 
 $MTR = \frac{1}{EVA}$ 
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

EQUIPMENT INFORMATION / FAILURE / MAINTAINABILITY DATA

BUILDING BLOCK NO. B-1000-0001

ITEM NAME	DESCRIPTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	FAILURE DATA			MAINTAINABILITY DATA					REMARKS
							DATE (X10 <sup>-6</sup> HRS)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)
BOILER SYSTEM (CONTINUED) AUTOMATIC ON-TRIPS	CONTROLS FIRING RATE OF BOILERS, MAIN CONTROL VALVE, DEPART GAUGES, DANGEROUS MONITOR, STACK MONITOR, LOW WATER CUTOFF, HIGH WATER CUTOFF (WITH ALARM), STEAM SOURCE, STEAM FLOW METER, DANGER ALARM INDICATOR, RECORDER, FEED WATER TEMPERATURE, PRESSURE RECORDER, OXYGEN INDICATOR & RECORDER, AUTOMATIC CONTROLS FOR BOILERS (MONITOR EQUIPMENT - FLAME GUARD CONTROLS ETC ARE SUPPLIED WITH THE BOILERS)	-	-	1	*	3									
FUEL OIL TANKS AND PUMPS	SUPPLY FUEL OIL FOR BOILERS AND THE REST OF THE SITE (PUMPS - VIKING SIO SERIES)	-	-	3	*	3									

THE TANKS ARE EACH 25,000 GAL CAPACITY THERE IS 2 OUT OF 3 REDUNDANCY AMONG THE PUMPS

$$ZNA = \frac{1}{ZNA} \times 10^{-6} \text{ /HRS}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF} \times 100\%}$$

$$MTBF = \frac{1}{ZNA} \times 10^{-6} \text{ HRS}$$

$$MTTR = \frac{ZNA}{ZNA} \times 100\%$$

$$ZNA = \frac{ZNA}{ZNA} \times 10^{-6}$$

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

## BUILDING BLOCK NO. 8 UTILITIES (U-1)

ITEM NO.	DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS
	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE (X 10 <sup>-6</sup> /HR)	SOURCE (*)	NA TM (X 10 <sup>-6</sup> )	CHECK-OUT TIME (HR)	REPAIR TIME (HR)	
1	WATER TREATMENT (WATER TOWER)	THIS EQUIPMENT IS IN ADDITION TO THE EXISTING WATER TOWER. THERE ARE TWO SOFTENERS. THESE ARE TWO SOFTENERS. THESE ARE TWO SOFTENERS. THESE ARE TWO SOFTENERS.	CULLIGAN MODEL HA-450	-	1	*	3						TWO UNIT WATER TOWER OPERATED AT 20 GPM UNIT LOW RATE.
2	WATER TREATMENT (WATER TOWER)	THIS EQUIPMENT IS IN ADDITION TO THE EXISTING WATER TOWER. THERE ARE TWO SOFTENERS. THESE ARE TWO SOFTENERS. THESE ARE TWO SOFTENERS.	CULLIGAN MODEL HA-450	-	1	*	3						A SMALL MODIFIED UNIT WITH DEFECT CAPABILITY.
3	AIR COMPRESSOR	PROVIDES COMPRESSED AIR FOR PUMPS, CYLINDERS, PLANT AIR ETC.	LE-KOT (DECEASED) MODEL 5022 KAHN CORP (UNIT INT. - EGRATOR)	-	2	*	3						REPLACEMENT QUANTITIES (OF 2 REQUIRED). 20000 DURING AIR FOR THE UNIT'S E.T. FRESH PLANS DO NOT REFLECT THIS.
4	EMERGENCY GENERATOR	THE EMERGENCY GENERATOR PROVIDES POWER FOR CONTINUED SHUTDOWN IN THE EVENT OF FAILURE TO THE PLANT POWER SOURCE. THERE ARE NO PLANS TO OPERATE A	SUPERIOR	-	1	*	3						

INFORMATION IS DETAILED IN Supplemental Data Sheet

$$INA = \frac{1}{MTBF} \times 10^{-6}/HR$$

$$INATH = \frac{1}{MTTR} \times 10^{-6}$$

$$MTBF = \frac{1}{INA}$$

$$MTTR = \frac{1}{INATH}$$

$$HRS$$

$$HRS$$

$$HRS$$

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCKS UTILITIES (U.S.)

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS	
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (H)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME TH (HR)		NA TH ( $\times 10^{-6}$ )
UTILITY HEAT	SUPPLIES STEAM HEAT FOR TEMPERATURE CONTROL IN THE VARIOUS BUILDINGS.	-	-	1	*	3									THE ALLIT CHANGING EQUIPMENT IS NOT TO BE USED FOR NOT BE AVAILABLE IN 1947 DEC. 1948. 1949-50-51 IS NOT BE RELEASED.

$$MTBF = \frac{1}{\frac{1}{ENR}} = \frac{1}{\frac{1}{10^{-6}} \text{ HRS}} = 10^6 \text{ HRS}$$

$$ENR = \frac{1}{10^{-6}} \text{ HRS}$$

$$MTR = \frac{ENR}{10^6} = \frac{10^6}{10^6} = 1$$

$$ENR = 10^{-6} \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{1}{10^6}} \times 100\% = 100\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

#8 UTL

FAILURE RATE FACTORS:

HIGH CYCLIC APPLICATION FACTOR:

	MUNITION PROCESSING RATE (DA)	MUNITION PROCESSING RATE (HR)	FAILURE RATE FACTOR
CONDITION A (BASE)	N/A	N/A	1 (BASE)
CONDITION 1	400	20	2
CONDITION 2	650	32.5	3.25
CONDITION 3	800	40	4
CONDITION 4	1000	50	5

MAINTAINABILITY FACTORS:

MAINTAINABILITY FACTOR (SUIT REQUIREMENT):

<u>SUIT REQUIREMENT</u>	<u>CONDITION B FACTOR</u>
STREET	1
GLOVES	1.5
MASK AND GLOVES	2
PRESSURIZED SUIT	3

MAINTAINABILITY FACTOR (ACCESSIBILITY/SPACE LIMITATIONS)

<u>ACCESSIBILITY/SPACE LIMITATION</u>	<u>CONDITION C FACTOR</u>
NO LIMITATION	1
LIMITATION	1.33

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #9 ECC HYDRAULICS (EHM)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAILABILITY
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	1836.106	545	18514.839	10.08	.981
Rocket, 115mm, M55	VX	Comp B	M28	1836.106	545	18514.839	10.08	.981
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121A1	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M122	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 8", M426	GB	None	None	N/A	N/A	N/A	N/A	N/A
Projectile, 155mm, M121A1	VX	None	None	N/A	N/A	N/A	N/A	N/A
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	4328.873	231	43193.280	9.93	.95
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	2874.761	348	28797.521	10.02	.97
Projectile, 155mm, M104	HD	Tetrytol	None	2874.761	348	28797.521	10.02	.97
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	3497.954	286	11655.711	10.00	.96
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	4328.873	231	43193.280	9.93	.95
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	4328.873	231	43193.280	9.93	.95

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #9 ECC HYDRAULICS (EHM)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVA: ABII
*BULK ITEMS, GB/VX								
Bomb, 750#, MQ-1	GB	None	None	N/A	N/A	N/A	N/A	N/
Tank, Spray, TMU-28/B	VX	None	None	N/A	N/A	N/A	N/A	N/
Ton Container	GB	None	None	N/A	N/A	N/A	N/A	N/
Tone Container	VX	None	None	N/A	N/A	N/A	N/A	N/
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	N/A	N/A	N/A	N/A	N/

SUPPLEMENTAL DATA

BUILDING BLOCK

#10.9 ECC HYD-  
-RAULICS (E4M)

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. TCDS 08-308-02 DATE: 1 MAY 1975
- b. DOCUMENT NO. CAMDS REPAIR PARTS DATE: 29 AUGUST 1975  
(INVENTORY CONTROL SYSTEM)
- c. OTHER TRW GENERATED FMEA DATE: 2 OCTOBER 1975
- d. DISCUSSION WITH TEAD (T. THOMAS) 21 OCTOBER 1975
- e. COMPONENT SUPPLIER CATALOGS

## 2. NOTES

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER SEE NOTE
- b. OTHER RADC-TR-74-268, FINAL REPORT, OCTOBER 1974, "REVISION OF RAI  
NONELECTRONIC RELIABILITY NOTEBOOK" (RADC-TR-69-458; SECTION

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCE  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST DATA

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RNA SEE NOTE
- b. TEAD/EA SEE NOTE
- c. OTHER RADC-TDR-64-373, VOL II FINAL REPORT, DECEMBER 1964, "ANALY  
OF MAINTENANCE TASK TIME DATA"

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOURCES  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST DATA

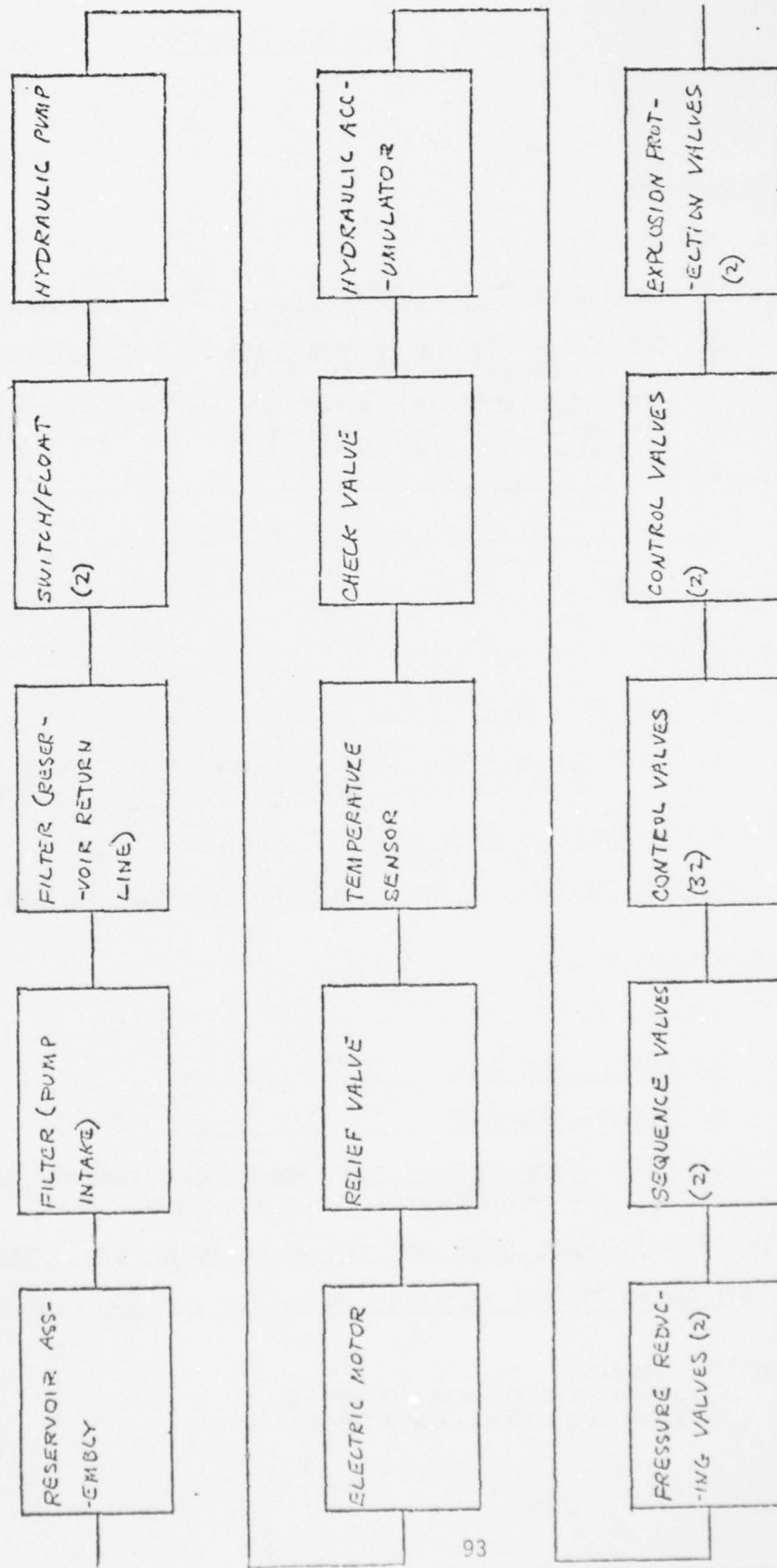
## D. GENERAL REMARKS

FIRST SUBMITTAL DATE: 11-20-75  
SECOND SUBMITTAL DATE: 12-30-75



# BUILDING BLOCK: #9 ECC HYDRAULICS (EHM)

## FLOW CHART



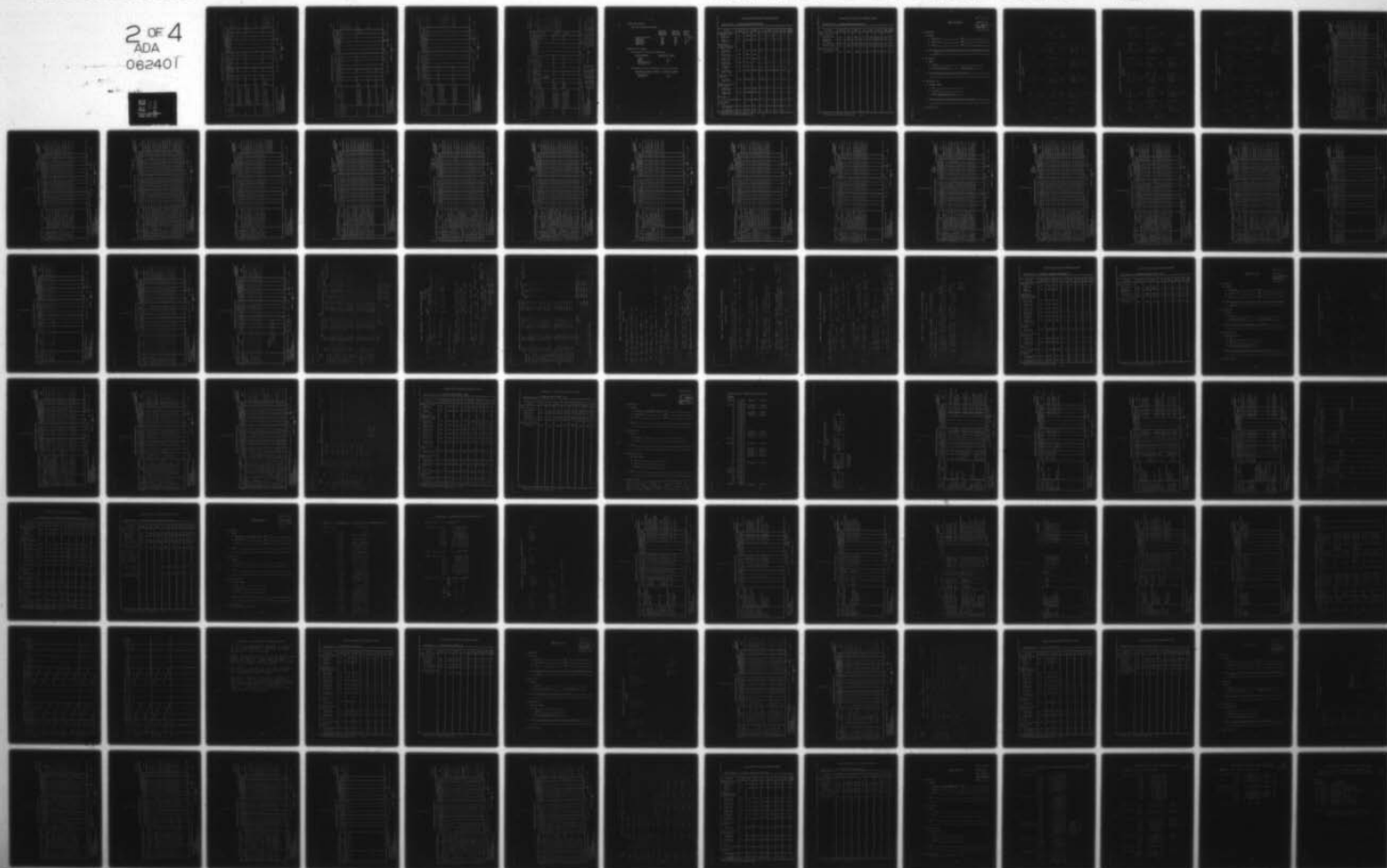
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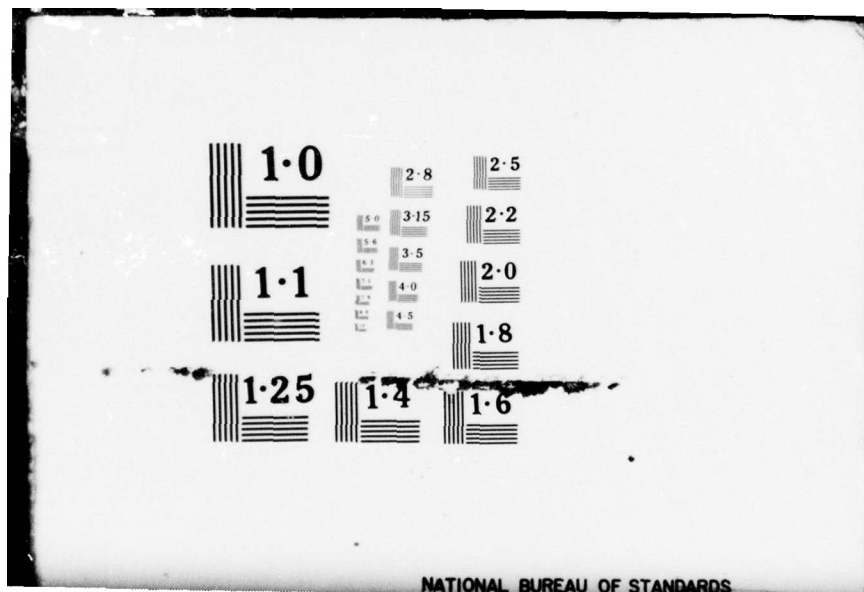
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RELIABILITY AND MAINTENANCE PROGRAM ANALYSIS RELIABILITY AND MA--ETC(U)  
APR 76 DAAG49-75-C-0135

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NATIONAL BUREAU OF STANDARDS

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 9 ECC WATER SYSTEM

DESCRIPTION		FAILURE DATA						MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	NA TM ( $\times 10^{-6}$ )	SOURCE (*)
RESERVOIR ASSEMBLY	CONTAINS THE HYDRAULICS SUPPLY.	"T-100	62983	1	0214	2	6.623	P31	6.623				9.0	59.607	P167, P168	REMOVE AND REINSTALL 45 HR./ENGINE 3000
FILTER	PUMP INTAKE - FILTERS HYDRAULIC FLUID BEFORE IT IS PUMPED THROUGH THE SYSTEM.	"SOF-2F-10	62983	1	0210	2	2.997	P21	2.997				3.2	9.558	P169, P170, P171, P172, P173, P174, P175, P176, P177, P178, P179, P180, P181, P182, P183, P184, P185, P186, P187, P188, P189, P190, P191, P192, P193, P194, P195, P196, P197, P198, P199, P200, P201, P202, P203, P204, P205, P206, P207, P208, P209, P210, P211, P212, P213, P214, P215, P216, P217, P218, P219, P220, P221, P222, P223, P224, P225, P226, P227, P228, P229, P230, P231, P232, P233, P234, P235, P236, P237, P238, P239, P240, P241, P242, P243, P244, P245, P246, P247, P248, P249, P250, P251, P252, P253, P254, P255, P256, P257, P258, P259, P260, P261, P262, P263, P264, P265, P266, P267, P268, P269, P270, P271, P272, P273, P274, P275, P276, P277, P278, P279, P280, P281, P282, P283, P284, P285, P286, P287, P288, P289, P290, P291, P292, P293, P294, P295, P296, P297, P298, P299, P300, P301, P302, P303, P304, P305, P306, P307, P308, P309, P310, P311, P312, P313, P314, P315, P316, P317, P318, P319, P320, P321, P322, P323, P324, P325, 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P824, P825, P826, P827, P828, P829, P830, P831, P832, P833, P834, P835, P836, P837, P838, P839, P840, P841, P842, P843, P844, P845, P846, P847, P848, P849, P850, P851, P852, P853, P854, P855, P856, P857, P858, P859, P860, P861, P862, P863, P864, P865, P866, P867, P868, P869, P870, P871, P872, P873, P874, P875, P876, P877, P878, P879, P880, P881, P882, P883, P884, P885, P886, P887, P888, P889, P890, P891, P892, P893, P894, P895, P896, P897, P898, P899, P900, P901, P902, P903, P904, P905, P906, P907, P908, P909, P910, P911, P912, P913, P914, P915, P916, P917, P918, P919, P920, P921, P922, P923, P924, P925, P926, P927, P928, P929, P930, P931, P932, P933, P934, P935, P936, P937, P938, P939, P940, P941, P942, P943, P944, P945, P946, P947, P948, P949, P950, P951, P952, P953, P954, P955, P956, P957, P958, P959, P960, P961, P962, P963, P964, P965, P966, P967, P968, P969, P970, P971, P972, P973, P974, P975, P976, P977, P978, P979, P980, P981, P982, P983, P984, P985, P986, P987, P988, P989, P990, P991, P992, P993, P994, P995, P996, P997, P998, P999, P1000, P1001, P1002, P1003, P1004, P1005, P1006, P1007, P1008, P1009, P1010, P1011, P1012, P1013, P1014, P1015, P1016, P1017, P1018, P1019, P1020, P1021, P1022, P1023, P1024, P1025, P1026, P1027, P1028, P1029, P1030, P1031, P1032, P1033, P1034, P1035, P1036, P1037, P1038, P1039, P1040, P1041, P1042, P1043, P1044, P1045, P1046, P1047, P1048, P1049, P1050, P1051, P1052, P1053, P1054, P1055, P1056, P1057, P1058, P1059, P1060, P1061, P1062, P1063, P1064, P1065, P1066, P1067, P1068, P1069, P1070, P1071, P1072, P1073, P1074, P1075, P1076, P1077, P1078, P1079, P1080, P1081, P1082, P1083, P1084, P1085, P1086, P1087, P1088, P1089, P1090, P1091, P1092, P1093, P1094, P1095, P1096, P1097, P1098, P1099, P1100, P1101, P1102, P1103, P1104, P1105, P1106, P1107, P1108, P1109, P1110, P1111, P1112, P1113, P1114, P1115, P1116, P1117, P1118, P1119, P1120, P1121, P1122, P1123, P1124, P1125, P1126, P1127, P1128, P1129, P1130, P1131, P1132, P1133, 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P1992, P1993, P1994, P1995, P1996, P1997, P1998, P1999, P2000, P2001, P2002, P2003, P2004, P2005, P2006, P2007, P2008, P2009, P2010, P2011, P2012, P2013, P2014, P2015, P2016, P2017, P2018, P2019, P2020, P2021, P2022, P2023, P2024, P2025, P2026, P2027, P2028, P2029, P2030, P2031, P2032, P2033, P2034, P2035, P2036, P2037, P2038, P2039, P2040, P2041, P2042, P2043, P2044, P2045, P2046, P2047, P2048, P2049, P2050, P2051, P2052, P2053, P2054, P2055, P20560	

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 9, TDC HYDRAULIC PUMP

ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
						FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/\text{HR}$	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME $T_M (10^{-6})$	
ELECTRIC MOTOR (15HP, 1500 RPM, 3PH, 220V)	POWERS THE HYDRAULIC PUMP	-	62983	1	0213	2	1.206	P29	1.206	-	-	7.6	REMOVED AND REPAIRED FINDING: MOTOR WINDING LINE/120V, 220V IS BELIEVED THAT THIS APPLICATION, THE PUMP REMAINS AND REMOVED TIME IS 7.6
RELIEF VALVE	PROVIDES PROTECTION FOR THE HYDRAULIC SYSTEM IN THE EVENT OF AN OVERPRESSURE CONDITION.	14C75-060A-B-50	62983	1	0209	2	1.514	P41	1.514	-	-	9.6	REMOVED AND REPAIRED 198, 193, 210, 211, 212, 213, 241
TEMPERATURE SENSOR	PROVIDES DATA FOR REMOTE COM- PUTER MONITORING OF THE SYSTEM.	14C75-060A-B-50	62983	1	0207	3	-	-	-	-	-	-	INSTRUMENTS AND ACTION GUIDE
CHECK VALVE	PREVENTS OIL FROM BACKFLOWING INTO THE PUMP	14C75-060A-B-50	62983	1	0205	3	-	-	-	-	-	-	-

$$\text{ENR} = \frac{1}{\text{ENR}} \times 10^{-6} / \text{HR} \quad \text{ENR} = \frac{1}{\text{ENR}} \times 10^{-6}$$

$$\text{MTBF} = \frac{1}{\text{ENR}} \quad \text{HRS} \quad \text{MTTR} = \frac{\text{ENR}}{\text{ENR}} \quad \text{HRS}$$

$$\text{AVAILABILITY} = \frac{1}{1 + \frac{\text{MTTR}}{\text{MTBF}}} \times 100\% = \frac{1}{1 + \frac{\text{MTTR}}{\text{MTBF}}} \times 100\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period



DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHG-OUT TIME (HR)		TOTAL TIME $T_M$ ( $\times 10^{-6}$ )	NATH	SOURCE (*)
HYDRAULIC ACCUMULATOR	MAINTAINS A STEADY STATE HYDRAULIC OUTPUT FROM THE HYDRAULIC SYSTEM AT VARIOUS LOAD DEMANDS.	"A12050-20	62983	1	Q215	2	7.351	PM	7.351				2.5	18.3775	2791	REMARKS AND REMEDIAL ACTION: 100% IN / 4% OUT
PRESSURE REGULATING VALVES	MANUALLY OPERATED VALVES THAT ARE USED TO LOWER THE SYSTEM PRESSURE TO VALVES (AND OPERATING UNITS) IMMEDIATELY DOWNSTREAM.	"AT-06-B30	62983	2	Q203	3	—	—	—	—	—	—	—	—	—	VALVE REGULATION FOR PRESSURE TO A MAINTAINED CONTROLLABLE VARIATION (RIFICE) NEEDED THE EXPECTED FAILURE TO MAINTAIN A SET POINT OF A CONSEQUENCE
SEQUENCE VALVES	MANUALLY OPERATED VALVES THAT PROVIDE THE CAPABILITY TO INHIBIT FLOW IN CERTAIN LINES.	"CT-04-A33	62983	2	Q202	3	—	—	—	—	—	—	—	—	—	THESE VALVES WOULD BE SET AT FULL FLOW.

 $\text{EMA} = \times 10^{-6} / \text{HR}$ 

WIND	× 10 <sup>-6</sup>
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100
110	110
120	120
130	130
140	140
150	150
160	160
170	170
180	180
190	190
200	200
210	210
220	220
230	230
240	240
250	250
260	260
270	270
280	280
290	290
300	300
310	310
320	320
330	330
340	340
350	350
360	360
370	370
380	380
390	390
400	400
410	410
420	420
430	430
440	440
450	450
460	460
470	470
480	480
490	490
500	500
510	510
520	520
530	530
540	540
550	550
560	560
570	570
580	580
590	590
600	600
610	610
620	620
630	630
640	640
650	650
660	660
670	670
680	680
690	690
700	700
710	710
720	720
730	730
740	740
750	750
760	760
770	770
780	780
790	790
800	800
810	810
820	820
830	830
840	840
850	850
860	860
870	870
880	880
890	890
900	900
910	910
920	920
930	930
940	940
950	950
960	960
970	970
980	980
990	990
1000	1000

1

• Information is detailed in Supplemental Data Sheet

Failure Consequence Code

### Y - Catastrophic Failure

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period

3 - Minor Failure - Repair During  
4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{\Sigma \lambda}$$

HRS

MTTR - 1

WELSH

!

1

1

HR:

1

## EQUIPMENT INFORMATION AND FAILURE/VARIABILITY DATA

## BUILDING BLOCK MD-9 ECC HYDRAPLUM (COP)

DESCRIPTION					FAILURE DATA					MAINTAINABILITY DATA					REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. SOURCE (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SAFETY SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHG-OUT TIME (HR)	TEST TIME (HR)	NATH ( $\times 10^{-6}$ )	
ELECTRO-MECHANICAL VALVES THAT ARE USED TO CONTROL HYDRAULIC FLUID FLOW TO DOWN-STREAM OPERATING UNITS.	"P8UGN54L-012C-50	62983	32	0206	2	26.804	EST	772.38	33	26.804	26.804	26.804	26.804	26.804	
ELECTRO-MECHANICAL VALVES THAT ARE USED TO CONTROL HYDRAULIC FLUID FLOW TO DOWN-STREAM OPERATING UNITS.	"P8UGN54L-062-C-51	62983	2	0201	2	26.804	EST	53.602	23	26.804	26.804	26.804	26.804	26.804	
ELECTRO-MECHANICAL VALVES THAT ARE USED TO PROTECT THE HYDRAULIC SYSTEM FROM THE EFFECTS OF AN EXPLOSION.	"P8UGN54L-012A-50	62983	2	0204	2	26.804	EST	53.602	33	26.804	26.804	26.804	26.804	26.804	

CYCLE ITEM									
Information is detailed in Supplemental Data Sheet									
Failure Consequence Code	$\frac{N_A}{N_A + N_{A-1}}$	$\frac{N_{A-1}}{N_A + N_{A-1}}$	$MIBF = \frac{1}{\sum \frac{N_{A-1}}{N_A + N_{A-1}}}$	$1$	HRS	$\frac{INM}{N_A}$	$\frac{N_{A-1}}{N_A + N_{A-1}}$	HRS	$INM = \frac{N_{A-1}}{N_A + N_{A-1}} \times 10^{-6}$
1 - Catastrophic Failure	COWD A 174.258	830.424	N/A	N/A					
2 - Protection Line Shutdown Failure	COWD 1 174.258	1634.242	1836.106	545					
3 - Minor Failure - Repair During Maintenance Period	COWD 2 174.258	2760.503	2874.761	348					
4 - See Supplemental Data Sheet	COWD 3 174.258	3323.496	3447.954	36					
	COWD 4 174.258	4151.620	4328.878	.31					

FAILURE RATE FACTORS:

HIGH CYCLIC APPLICATION FACTOR:

	<u>MUNITION PROCESSING RATE (DA)</u>	<u>MUNITION PROCESSING RATE (HR)</u>	<u>FAILURE RATE FACTOR</u>
CONDITION A (BASE)	N/A	N/A	1 (BASE)
CONDITION 1	400	20	2
CONDITION 2	650	32.5	3.25
CONDITION 3	800	40	4
CONDITION 4	1000	50	5

MAINTAINABILITY FACTORS:

MAINTAINABILITY FACTOR (SUIT REQUIREMENT):

<u>SUIT REQUIREMENT</u>	<u>CONDITION B FACTOR</u>
STREET	1
GLOVES	1.5
MASK AND GLOVES	2
PRESSURIZED SUIT	3

MAINTAINABILITY FACTOR (ACCESSIBILITY/SPACE LIMITATIONS)

<u>ACCESSIBILITY/SPACE LIMITATION</u>	<u>CONDITION C FACTOR</u>
NO LIMITATION	1
LIMITATION	1.33

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #13 AGENT DESTRUCTION SYSTEM (ADS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	3397.2	294.4	23765.9	7.00	.95
Rocket, 115mm, M55	VX	Comp B	M28	4769.1	209.7	35493	7.55	.96
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	3397.2	294.4	23765.9	7.00	.95
Projectile, 155mm, M121A1	GB	None	None	"	"	"	"	"
Projectile, 155mm, M121	GB	None	None	"	"	"	"	"
Projectile, 155mm, M122	GB	None	None	"	"	"	"	"
Projectile, 8", M426	GB	None	None	"	"	"	"	"
Projectile, 155mm, M121A1	VX	None	None	4769.1	209.7	35493	7.55	.96
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	3397.2	294.4	23765.9	7.00	.95
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	2248.3	402.8	14483.4	6.44	.98
Projectile, 155mm, M104	HD	Tetrytol	None	"	"	"	"	"
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	4769.1	209.7	35493	7.55	.96
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	2248.3	402.8	14483.4	6.44	.98
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	"	"	"	"	"

\*MUNITION DEMILITARIZATION PROCESS FLOW



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #13 AGENT DESTRUCTION SYSTEM (ADS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MQ-1	GB	None	None	3397.2	294.4	23765.9	7.00	.97
Tank, Spray, TMU-28/B	VX	None	None	4769.1	209.7	35493	7.55	.96
Ton Container	GB	None	None	3397.2	294.4	23765.9	7.00	.97
Tone Container	VX	None	None	4769.1	209.7	35203	7.55	.96
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	2248.3	414.8	14483.4	6.44	.98



SUPPLEMENTAL DATABUILDING BLOCK  
# 13 AGENT DES JCT  
SYSTEM (ADS)  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available.

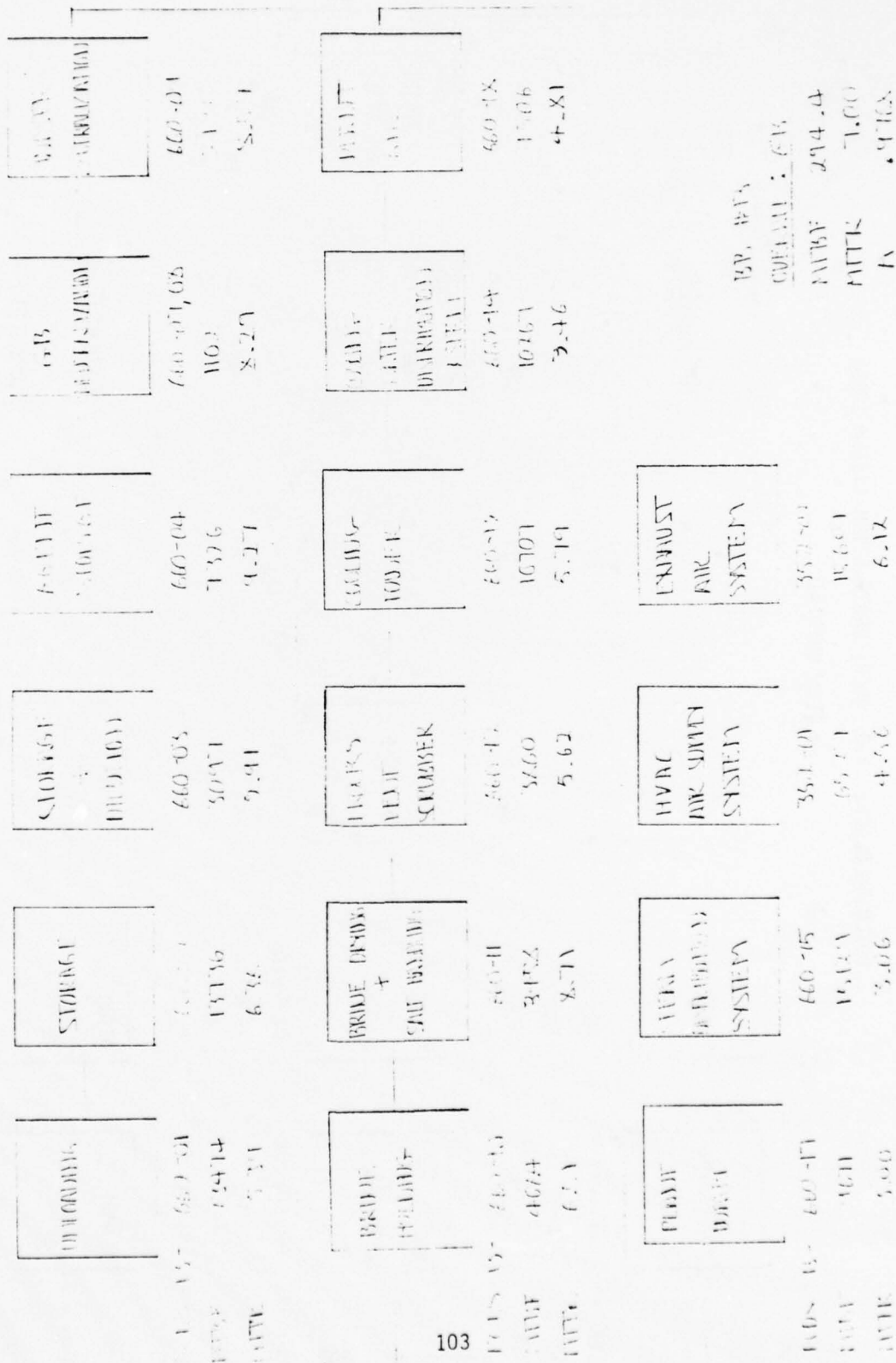
## D. GENERAL REMARKS

FLOW CHART

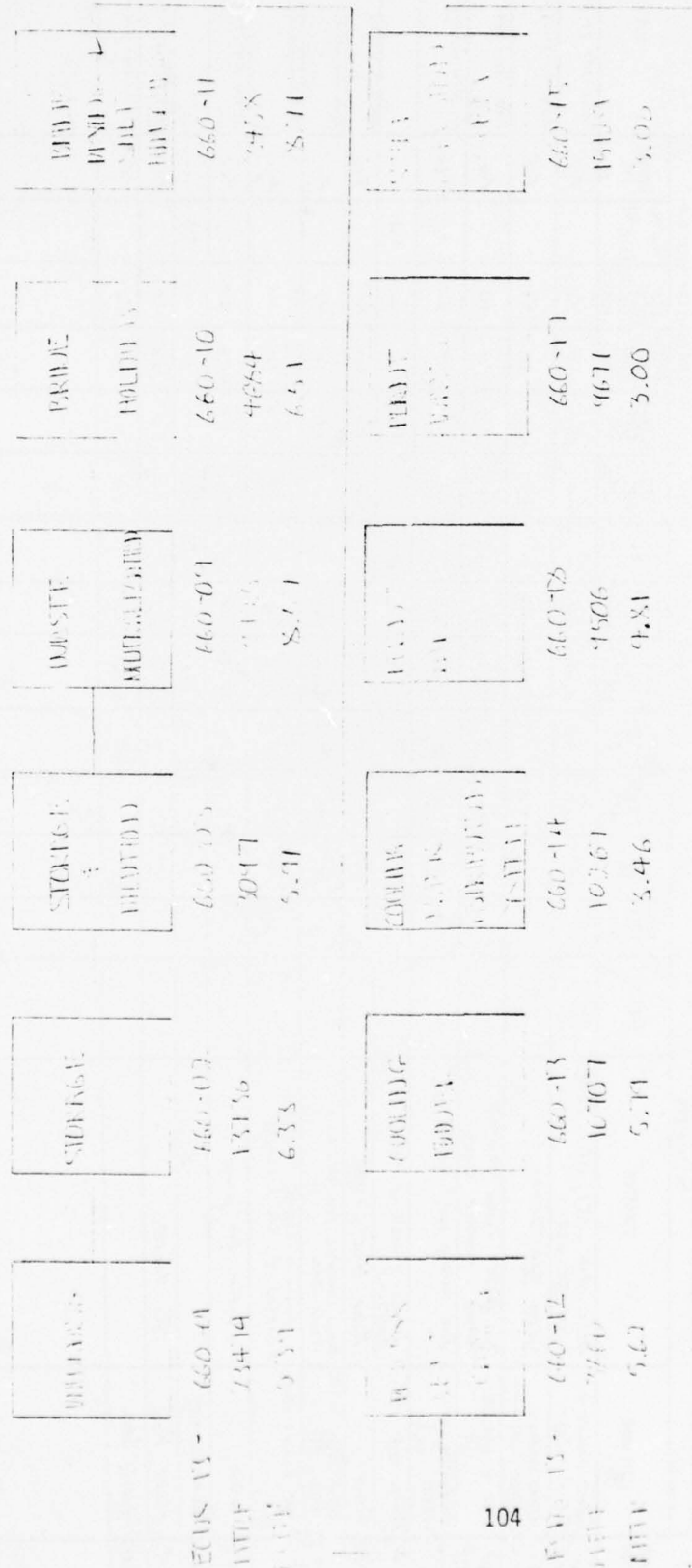


# BUILDING BLOCK: #13 AGENT DESTRUCTION SYSTEM (ADS)

## FLOW CHART



## FLOW CHART



BAL.	H73
CHELLS;	PASSIVE
FURBY	+44-2 W'
GUTT	6.49 W'
A	'155 I

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	DATE (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N.A.T.M (X10 <sup>-6</sup> )	SOURCE (*)			
3-1.1	HAND VALVE - GATE - DI -	MISC AIR, HCL, CL, STAN)			10	2	2	2.485	P15		1.0	2.0	1.0	4.0		P45	Valve under good m.c.		
3-1.2	HAND VALVE - GLOBE - M -	ALCOH CAR DRAIN			6	"	2	2.411	P15		1.0	2.0	1.0	4.0		P45	Valve under good m.c.		
3-1.3	CHECK VALVE - M -	TO DIRECT FLOW TOWARD TANKS & STORAGE TANKS			5	"	2	3.044	P41		1.0	2.0	1.0	4.0		P41	Valve checked good		
3-1.4	DIAPHRAGM GATE VALVE - M -	AIR SUPPLY LINE PRV			2	"	2	3.302	P31		1.0	3.8	1.0	5.8		P32	Air press good trouble m.c.		
3-1.5	TRUSS, INDO FI	MISC PRESS. (LOCAL) READINGS			7	"	3	1.020		NA					NA				
3-1.6	PUMP	FEED HCL & NaOH			2	"	2	1.055	P30		1.0	2.0	2.0	10.0		P30	Pump under good		
3-1.7	ONE FUNCTIONAL AIR TO CL - M -	TANK CAR			1	"	2	16.515	P41		1.0	2.8	1.0	4.8		P41	Valve under good m.c.		
3-1.8	SU REUSE VALVE	REUSE PRESS. AND AIR LINE(2) & CH LINE(1)			2	"	2	1.514	P41		1.0	2.0	1.0	4.0		P41	Valve under good		
3-1.9	meter	meter for pump			2	"	2	1.825	P38		1.0	4.0	1.0	6.0		P38	meter under good m.c.		
3-1.10	SHUTTER				2	"	3			NA					NA				
3-1.11	VALVE, PULL	SFO VALVES			6	"	2	2.113	P45		1.0	2.0	1.0	4.0		P45	Valve under good m.c.		
3-1.12	VALVE, BALL				5	"	2	3.027	P41		1.0	2.0	1.0	4.0		P41	Valve, ball good m.c.		

a. PAID ECU513-660 - See Census Form ref. file.

\*Information is detailed in Supplemental Data Sheet

\*\*F8 - Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

$$\begin{aligned}
 \text{INA} &= \frac{1}{\text{EN}} \times 10^{-6} / \text{HR} & \text{ENATM} &= \frac{\text{ENATM}}{\text{EN}} \times 10^{-6} \\
 \text{MTDF} &= \frac{1}{\text{EN}} \times 10^{-6} / \text{HR} & \text{MTR} &= \frac{\text{MTR}}{\text{EN}} \times 100\% \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTR}} \times 100\%
 \end{aligned}$$

c. Grade used in file.

w. 2.113, 1.825, 1.020

- 2.113, 1.825



478

SHEET 2 OF 18  
#13 AGENT DESTRUCTION  
SYSTEM (ADS)

✓ 07/10/10-15  
10 10/10/10

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Storage

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MSG CODE NO.	QTY (N)	INFO. SOURCE (S)	FAILURE DATA				MAINTAINABILITY DATA					REMARKS	
							FAIL CONSEQ. (S)	DATE (X10 <sup>-6</sup> HR)	SOURCE (S)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TH (X10 <sup>-6</sup> )		SOURCE (S)
3.2.1	Hand Valve Pump	4125 NaOH AND HCl SERVICE			9	"	2	2.413	P45		1.0	2.0	1.0	4.0		P45	Valve closed in
3.2.2	Hand Valve BALL	Recycle NaOH Tank TO TANK			11	"	2	3.017	P41		1.0	2.0	1.0	4.0		P41	Valve closed in
3.2.3	Check Valve	DS OF Ea. Pump (1) of HCl Tank OIL VENT			41	"	2	3.014	P41		1.0	2.0	1.0	4.0		P41	Valve closed in
3.2.4	Press I.D.	LOCAL PRESS. DS Ea. Pump			41	"	3	1.010		NA							
3.2.5	Pump	Flow HCl TO DIL. TANK " NaOH " " & BATH TANKS			2	"	2	12.058	P30		1.0	2.0	2.0	10.0		P30	Pump closed 9/1
3.2.6	LEVEL AND LT	TANK LEVELS			2	"	2	11.905	P35		1.0	2.0	1.0	4.0		P35	and high low 8/1
3.2.7	Alarm	ALARM ASSOC. W. 13-7.6			2	"	2	3.742	P35		1.0	2.0	1.0	4.0		P35	and low 8/1
3.2.8	TANK	HCl (320) & NaOH (502) STORAGE			2	"	2	3.035	P39		1.0	2.5	2.0	2.0		P39	Heater closed 9/1
3.2.9	Heater	Heater Assoc. W. NaOH			1	"	2	6.714	P24		1.0	6.4	1.0	8.4		P24	Heater closed 9/1
3.2.10	Valve	Water for pump			2	"	2	4.815	P35		1.0	4.0	1.0	6.0		P35	Water for 5/1 (Closed 11)
3.2.11	Sub. Temp	Local Heater Temp			1	"	3			NA							

a. ECOS-60 -

b. On kinds of failure and maintenance

\* Information is detailed in Supplemental Data Sheet

\*\* Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$ENA = \frac{1}{MTBF} \times 10^{-6} \text{ /HR}$ 
 $INATH = \frac{1}{MTTR} \times 10^{-6}$ 
 $HAZ. TH = \frac{1}{MTBF} \times 100\%$

11-1-61  
 SHEET 3 OF 18  
 13 AGENT DESTRUCTION  
 SYSTEM (AUS)

✓ up to 5  
 10-10-55 Day

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (S)	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
							FAIL. CONSEQ. (S)	RATE (X 10 <sup>-6</sup> /HR)	SOURCE (S)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	HAZ. TM (X 10 <sup>-6</sup> )	
3-31	HAND VALVE, P146, R1	MISC NaOH & HCl SERVICE			7	-03	2	2.483	P15		1.0	2.0	1.0		Value when you get the
3-32	CHECK VALVE	D/S EA PUMP(4), P14 IN LINE, P14 NaOH LINE			7	"	2	3.041	P11		1.0	2.0	1.0		Value when you get the
3-33	PUMP	PUMP HCl & NaOH			4	"	2	12.053	P10		1.0	7.0	2.0	10.0	Value when you get the
3-34	PRESS. IND	LOCAL PRESS O PUMP P15			8	"	3	(1.000)		NA					Value when you get the
3-35	HAZ. NaOH VALVE	HAZ. NaOH VALVE, P14 IN LINE, P14 NaOH LINE			3	"	2	12.515	P11		1.0	2.0	1.0		Value when you get the
3-36	LEVEL IND	LEVEL IND EA. 3 TANKS			3	"	2	11.205	P15		1.0	2.0	1.0		Value when you get the
3-37	ALARM	ALARM ASSOC. W. 13-3.6			3	"	2	3.716	P15		1.0	2.0	1.0		Value when you get the
3-38	TANK	HCl DIL. TANK, NaOH DIL & STORAGE TANKS			3	"	2	3.035	P19		1.0	2.0	2.0	2.8	Value when you get the
3-39	HEATER	HEATERS FOR 13-3.8			3	"	2	6.777	P14		1.0	6.4	1.0	8.4	Value when you get the
3-40	ACTIVATOR	TANK ACTIVATOR (DIL. TANKS)			2	"	2	8.531	P18		1.0	2.0	1.0		Value when you get the
3-41	TEMP	TANK TEMP (DIL. TANKS)			2	"	2	25.674	P10		1.0	3.0	2.0	6.0	Value when you get the
3-42	ACTIVATOR	ACTIVATOR FOR PUMP 6			4	"	2	4.825	P18		1.0	1.0	1.0	6.0	Value when you get the
3-43	SENS. TEMP	TEMP SENS LOCAL HEATING LINE			5	"	3			1/2				NA	Value when you get the
3-44	COOLER	NaOH COOLER			1	"	2	3.677	P10		1.0	6.0	2.0	9.0	Value when you get the
3-45	VALVE, BALL	MISC NaOH SERVICE			3	"	2	3.037	P11		1.0	2.0	1.0		Value when you get the
3-46	ACTIVATOR	ACTIVATOR IN THE LINE			1	"	2	7.252	P18		1.0	2.0	1.0		Value when you get the
3-47	ACTIVATOR	ACTIVATOR			1	"	2	3.324	P18		1.0	2.0	1.0		Value when you get the
3-48	FLOW METER	Flow METER			4	"	2	21.415	P10		1.0	3.0	2.0	6.0	Value when you get the

ENA =  $\frac{1}{1 + \frac{MTR}{MTBF}} \times 10^{-6}$  /HR  
 EHA =  $\frac{1}{1 + \frac{MTR}{MTBF}} \times 10^{-6}$  /HR  
 MTR =  $\frac{1}{1 + \frac{MTR}{MTBF}} \times 100\%$   
 AVAILABILITY =  $\frac{1}{1 + \frac{MTR}{MTBF}} \times 100\%$   
 Information is detailed in Supplemental Data Sheet 2. See Remarks for details.  
 Failure Consequence Code:  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

14725

SHEET 4 OF 18  
 AGENT STORAGE  
 NOT REPAIRED  
 6/10/75 ONLY DATE BUILDING BLOCK

THIS DWG WAS  
 NOT REPAIRED  
 6/10/75 ONLY DATE BUILDING BLOCK

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

AGENT STORAGE

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DESIGN TIME (HR)	REPAIR TIME (HR)	CHECK OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> )	
3-41	HAND VALVE	TANK OUT TO O.H. VENT			4	2-04	2	2.03	P45		1.0	2.0	1.0	4.0	Value water pump in
3-42	CHECK VALVE	FROM DIRECT TOWARD TANK TANKS			4	"	2	3.04	P41		1.0	2.0	1.0	4.0	Value check valve
3-43	PRESS X-DUCK	TANK OUT PRESS			2	"	2	3.435	P46		1.0	3.0	2.0	6.0	Removable pump gnd
3-44	Pump	PUMP AGENT TO TANK TANKS (PUMP SUBMERGED)			2	"	2	13.629	P30		1.0	7.0	2.0	10.0	Pump level mid in (summers)
3-45	Motor Flow Control Valve (CAIS)	Control Agent Flow			6	"	2	16.515	P41		1.0	2.9	1.0	4.8	Value check valve
3-46	LEVEL T.M.D. LT	TANK LEVEL			2	"	2	11.905	P25		1.0	2.0	1.0	4.0	Value level gnd
3-47	TANKS	CAIS STORAGE, Vx STORAGE			2	"	2	3.035	P34		1.0	2.5	2.0	2.5	Value mid in gnd in
3-48	AGITATOR	TANK TANKS			2	"	2	8.728	P48		1.0	2.0	1.0	4.0	Value tank gnd in
3-49	TANK TEMP	TEMP MEAS - REMOTE			2	"	2	25.692	P30		1.0	3.0	2.0	6.0	Temperature pump gnd
3-50	Valve	Valve for pump			2	"	2	4.825	P48		1.0	4.0	1.0	6.0	Value stop (summers)

6. See Bonds file ref follow

a. ECD 13-660-

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$ENR = \frac{1}{ENR} = \frac{1}{ENR} \times 10^{-6} / HR$   
 $MTTR = \frac{1}{MTTR} = \frac{1}{MTTR} \times 1000 = \frac{1}{MTTR}$   
 $AVAILABILITY = \frac{1}{1 + MTBF} \times 1000 = \frac{1}{1 + MTBF}$

ALICE - EITHER G3  
 OR Vx (OR EITHER  
 IF MUSTARD PROCESSOR)  
 IS USED BUT NOT  
 BOTH @ SAME TIME

as of wk of 10/13/75  
this day date  
November 6/12/75

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Ux Acid Chlorination - 1

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ. (**)	DATE X10 <sup>-6</sup> /HR	NA	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	
3-51	HAND VALVE GATE -X1-	MISC CL <sub>2</sub> , Ux, HCl/H <sub>2</sub> O SERVICE			5	-05	2	2.473	P45		1.0	2.0	1.0	4.0	P45 - Value Hand gun gnd H <sub>2</sub>
3-52	CHIEF VALVE	W/S CL <sub>2</sub> DRAIN VALVE			1		2	3.014	P41		1.0	2.0	1.0	4.0	Value dead gnd
3-53	WARNING GATE VALVE -X1-	STM PRV			1	"	2	3.502	P32		1.0	3.5	1.0	5.5	P41 - Valve dead gnd
3-54	PRESS IND	CL <sub>2</sub> TANK PRESS.			1	"	2	3.715	P40		1.0	3.0	2.0	6.0	P41 - Valve dead gnd
3-55	ALARM	ALARM ASSOC. W. 13-5.4			1	"	2	3.774	P45		1.0	2.0	1.0	4.0	P41 - Valve dead gnd
3-56	FLOW FROM CHIEF VALVE (GATE) -X1-	FLOW CONTROL CL <sub>2</sub> , Ux, HCl (G <sub>2</sub> ) P41, & STM.			5	"	2	16.515	P41		1.0	2.9	1.0	4.8	Transmitter press gnd
3-57	EVEL IND.	TANK LEVEL			3	"	2	11.405	P45		1.0	2.0	1.0	4.0	Ind gnd gnd
3-58	ALARM	ALARM ASSOC. W. 13-5.7			3	"	2	3.774	P45		1.0	2.0	1.0	4.0	Ind gnd gnd
3-59	TANK	CL <sub>2</sub> , Ux, & HCl/H <sub>2</sub> O BATCH			3	"	2	3.085	P39		1.0	2.5	2.0	2.3	Ind gnd gnd
3-60	TEMP IND	CL <sub>2</sub> TANK TEMP			1	"	2	25.612	P40		1.0	3.0	2.0	4.0	Transmitter temp gnd
3-61	EXHAUST IND	W/OUT OF TANK CONTROLS			3	"	2	16.151	P42		1.0	3.0	2.0	6.0	Ind gnd gnd
3-62	PSV RV	RELEASE CL <sub>2</sub> VAP TO PROCESS VENT SURGE TANK			1	"	2	2.271	P41		1.0	2.0	1.0	4.0	Value dead gnd H <sub>2</sub>
3-63	ALARM	ALARM FOR 13-5.11			3	"	2	3.774	P45		1.0	2.0	1.0	4.0	Ind gnd gnd

2. ECD 13-660 -

b. See Omds Fig 11.14 folder

\* Information is detailed in Supplemental Data Sheet

\*\* Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{\frac{1}{EN} + \frac{1}{MTR} + \frac{1}{ENM}} \times 10^{-6} \text{ HRS}$$

$$EN = \frac{1}{\frac{1}{ENM} + \frac{1}{MTR} + \frac{1}{EN}} \times 10^{-6} \text{ HRS}$$

$$MTR = \frac{1}{\frac{1}{ENM} + \frac{1}{EN} + \frac{1}{MTBF}} \times 10^{-6} \text{ HRS}$$

$$ENM = \frac{1}{\frac{1}{EN} + \frac{1}{MTR} + \frac{1}{MTBF}} \times 10^{-6} \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTBF}{MTBF + ENM + MTR}} \times 100\% = \frac{1}{1 + \frac{MTBF}{ENM + MTR + MTBF}} \times 100\%$$



147-1  
SHEET 6 OF 18  
#13 AGENT DESTRUCTION  
SYSTEM (ADS)  
BUILDING BLOCK

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

1X AGD CHLORINATION-2

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	IFAIL CONSEQ (**)	FAILURE DATA			MAINTAINABILITY DATA 3J				REMARKS
								DATE X10 <sup>-6</sup> HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> )	
3-6-1	HAND VALVE	MISC			25	"	2	2.415	P45		1.0	2.0	1.0	4.0	P45- When also good 14
3-6-2	GATE VALVE	DIS of Pumps			4	"	2	2.415	P45		1.0	2.0	1.0	4.0	When also good 14
3-6-3	CHLORINE VALVE	" Interm pump and			4	"	2	3.014	P41		1.0	2.0	1.0	4.0	When also good 14
3-6-4	Pressure Switch	RV non reaction pumps and			4	"	2	3.302	P40		1.0	3.8	1.0	5.5	When also good 14
3-6-5	Pressure Switch	Feed back line			2	"	3	1.070		NA				1/4	When also good 14
3-6-6	Pressure Switch	Reaction pressure			2	"	2	3.435	P40		1.0	3.0	2.0	6.0	When also good 14
3-6-7	Pump	Pumps 1/2 and 2 Coolant/ Mixed fresh water			4	"	2	12.058	P40		1.0	7.0	2.0	10.0	When also good 14
3-6-8	Pressure Switch	Reverse flow control function Cl <sub>2</sub> H <sub>2</sub> O, agit H <sub>2</sub> O etc.			17	"	2	16.515	P41		1.0	3.8	1.0	4.8	When also good 14
3-6-9	Alarm	Alarm for Weight and Temp. Intake			5	"	2	3.740	P45		1.0	2.0	1.0	4.0	When also good 14
3-6-10	Tank	Reaction tank			2	"	2	3.035	P49		1.0	2.5	2.0	2.8	When also good 14
3-6-11	Tank	PAD tank			2	"	2	2.121	P45		1.0	2.5	2.0	2.5	When also good 14
3-6-12	Agitator	Tank agitator			2	"	2	8.515	P41		1.0	2.0	1.0	4.0	When also good 14
3-6-13	Temperature	Tank Temperature			5	"	2	25.040	P40		1.0	3.0	2.0	6.0	When also good 14
3-6-14	Weight Indicator	Tank Weight (constant level)			2	"	2	16.152	P40		1.0	3.0	2.0	6.0	When also good 14
3-6-15	FSV	Feed (1) valve, PAD & Coolant			4	"	2	2.271	P41		1.0	2.0	1.0	4.0	When also good 14
3-6-16	Pressure Switch	Feed (2) valve, PAD & Coolant			1	"	2	16.515	P41		1.0	2.8	1.0	4.8	When also good 14
3-6-17	Pump Motor	Motor for pumps 13-17			4	"	2	1.125	P45		1.0	4.0	1.0	6.0	When also good 14

a. P415 ECDS 13-660 -  
 Information is detailed in Supplemental Data Sheet  
 Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet  
 b. See Chart  
 ENA =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 100\%$   
 INATM =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 10^{-6}$  /HR  
 MTR =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 100\%$   
 INATM =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 10^{-6}$  /HR  
 Availability =  $\frac{1}{1 + \frac{MTBF}{MTTR}} \times 100\%$



14-7-8  
SHEET 7 OF 18  
#13 AGENT OF STRUCTURE  
SYSTEM (ADS)  
BUILDING BLOCK

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA  
C-3/Ux Caustic Neutralization Level 4, 2nd. page

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (S)	FAIL. CONSEQ. (S)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (S)	NA	FAILURE DATA					MAINTAINABILITY DATA					REMARKS
											DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	NA TM $(\times 10^{-6})$	SOURCE (S)					
3-71	Hand valve 96-14-1	NaOH and CaB Boreh level outlet			2	a-07	2	2.433	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-72	Hand valve 96-14-1	TO O.H. Containment			1	"	2	2.433	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-73	Check valve 96-14-1	TO O.H. Containment			1	"	2	3.014	P41		1.0	2.0	1.0	4.0		P41					Value 14.0 gm 100 gpd
3-74	Water flow control valve 96-14-1	NaOH and CaB flow control inlet and outlet (Boreh tank)			5	"	2	16.515	P41		1.0	2.5	1.0	4.8		P41					Value 14.0 gm 100 gpd
3-75	Level indicator	Tank level			2	"	2	11.45	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-76	Water flow control valve 96-14-1	Tank (Contaminant) Water			2	"	2	16.515	P40		1.0	3.0	2.0	6.0		P40					Value 14.0 gm 100 gpd
3-77	Alarm	Alarm Alarm W. level and water indicator			14	"	2	7.714	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-78	Tank	NaOH and CaB Boreh tank service			2	"	2	3.015	P44		1.0	2.5	2.0	2.8		P44					Value 14.0 gm 100 gpd
3-79	Hand valve 96-14-1	NaOH and CaB Boreh tank service			7	a-05	2	2.433	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-80	Hand valve 96-14-1	NaOH and CaB Boreh tank service			7	"	2	2.433	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-81	Hand valve 96-14-1	NaOH and CaB Boreh tank service			5	"	2	3.014	P41		1.0	2.0	1.0	4.0		P41					Value 14.0 gm 100 gpd
3-82	Hand valve 96-14-1	NaOH and CaB Boreh tank service			4	"	2	3.415	P46		1.0	3.0	2.0	6.0		P46					Value 14.0 gm 100 gpd
3-83	Hand valve 96-14-1	NaOH and CaB Boreh tank service			2	"	2	13.053	P45		1.0	2.0	2.0	10.0		P45					Value 14.0 gm 100 gpd
3-84	Hand valve 96-14-1	NaOH and CaB Boreh tank service			13	"	2	16.515	P41		1.0	2.5	1.0	4.8		P41					Value 14.0 gm 100 gpd
3-85	Hand valve 96-14-1	NaOH and CaB Boreh tank service			2	"	2	11.45	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-86	Hand valve 96-14-1	NaOH and CaB Boreh tank service			4	"	2	25.414	P46		1.0	3.0	2.0	6.0		P46					Value 14.0 gm 100 gpd
3-87	Hand valve 96-14-1	NaOH and CaB Boreh tank service			2	"	2	11.45	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd
3-88	Hand valve 96-14-1	NaOH and CaB Boreh tank service			2	"	2	11.45	P45		1.0	2.0	1.0	4.0		P45					Value 14.0 gm 100 gpd

$MTBF = \frac{1}{\lambda} = \frac{1}{16.515} \times 10^6 / HR$   
 $MTTR = \frac{1}{\lambda} = \frac{1}{16.515} \times 10^6 / HR$   
 $INMT = \frac{1}{\lambda} = \frac{1}{16.515} \times 10^6$   
 $INMTM = \frac{1}{\lambda} = \frac{1}{16.515} \times 10^6$   
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{1}{16.515}} \times 100\%$

a. ECD 3-660 - clinal wa shown in. See Cond 5-31 ref folder  
 b. See Cond 5-31 ref folder  
 c. clinal wa shown in. See Cond 5-31 ref folder  
 d. See Cond 5-31 ref folder

Information is detailed in Supplemental Data Sheet  
 Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

16-7-6

Wk of 10/13/11  
 Date 6/15/11

SHEET 2 OF 18  
 #13 AGENT DESTRUCTION  
 SYSTEM (ADS)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

30 lux Control Ventilation - 1st

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (S)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL. CONSEQ. (S)	DATE (X10 <sup>-6</sup> HR)	SOURCE (S)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> HR)	
3-105	Alarm	Alarm for level, Temp and pH.			7	4-08	2	2.775	P15	1.0	2.0	1.0	4.0	2nd 900 gpd
3-111	Tank	CO <sub>2</sub> delay reaction			2	"	2	3.015	P15	1.0	2.5	2.0	25	Tank level 10 gpd 10
3-112	Orifice	Tank orifice			2	"	2	8.511	P15	1.0	2.0	1.0	4.0	1st 1000 gpd 10
3-121	Condenser	Condensed Condenser			2	"	2	2.334	P15	1.0	6.4	1.0	8.4	2nd 1000 gpd 10
3-122	Flow Control Valve	Flow Control Valve			4	"	2	16.515	P15	1.0	2.5	1.0	4.5	Valve control 1000 gpd
3-123	Control	Alarm: Control - 1000 gpd			2	"	2	2.334	P15	1.0	6.4	1.0	8.4	Head exchange 1000 gpd
3-124	Flowmeter	Measure flow near loop and control valve			5	"	2	2.334	P15	1.0	3.0	2.0	6.0	Valve flow 1000 gpd
3-125	Pump	Pump 13-7.17			2	"	2	4.515	P15	1.0	4.0	1.0	6.0	2nd 1000 gpd

11. F20513-660 - 6. See Control Flow ref folder

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$MTBF = \frac{1}{\frac{1}{MTTR} + \frac{1}{MTBF}}$   
 $INATM = \frac{1}{\frac{1}{MTTR} + \frac{1}{MTBF}} \times 10^{-6}$   
 $INATM = \frac{1}{\frac{1}{MTTR} + \frac{1}{MTBF}} \times 10^{-6}$   
 $MTTR = \frac{1}{\frac{1}{MTTR} + \frac{1}{MTBF}} \times 100\%$   
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}}$

10/1/75  
10/1/75  
10/1/75

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Waste Control Neutralization

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ (**)	RATE (X 10 <sup>-6</sup> /HR)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X 10 <sup>-6</sup> )	
13-81	Hand pump	Waste spent liquid			11	09	2	2.435	P45	1.0	2.0	1.0	4.0	Value 11.0 gpm 9th fl.
13-82	Check valve	Waste - to direct flow			7	"	2	3.217	P41	1.0	2.0	1.0	4.0	Open check gnd
13-83	Pump indicator	Waste location - local			6	"	3	7.007	NA					
13-84	Pump	Pump down to hold tank (2)			4	"	2	12.058	P30	1.0	2.0	2.0	10.0	Temp down gnd
13-85	Pump motor	Pump pump to storage tank (1)			4	"	2	11.835	P38	1.0	1.0	1.0	6	near 500 gpm (not measured)
13-86	Waste flow control valve (gnd)	Central process flow			12	"	2	16.505	P41	1.0	2.8	1.0	4.8	Value 10.0 gpm 9th fl.
13-87	Low level LT	Tank level remote			3	"	2	11.905	P45	1.0	2.0	1.0	4.0	Ind by low gnd
13-88	Low level LT	Waste pH			3	"	2	11.905	P35	1.0	2.0	1.0	4.0	Ind by low gnd
13-89	Low level LT	Waste Waste tank			2	"	2	25.612	P40	1.0	3.0	2.0	6.0	Remains Temp gnd
13-90	Alarm	Alarm for 13-27 13-35			2	"	2	3.742	P35	1.0	2.0	1.0	4.0	Ind gnd gnd
13-91	Tank	Waste tank (2) dump tank (1)			3	"	2	3.015	P39	1.0	2.5	2	2.5	Ind 10.0 gpm 9th fl.
13-92	Agitator	Waste tank			2	"	2	8.511	P41	1.0	2.0	1.0	4	Ind 10.0 gpm 9th fl.

13-81-660-  
 13-82-660-  
 13-83-660-  
 13-84-660-  
 13-85-660-  
 13-86-660-  
 13-87-660-  
 13-88-660-  
 13-89-660-  
 13-90-660-  
 13-91-660-  
 13-92-660-

MTBF =  $\frac{1}{\text{ENA}}$  =  $\frac{1}{1}$  = 1 HRS  
 ENA =  $\frac{1}{\text{MTBF}}$  =  $\frac{1}{1}$  = 1 HRS  
 MTTR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
 ENR =  $\frac{1}{\text{MTTR}}$  =  $\frac{1}{1}$  = 1 HRS  
 AVAILABILITY =  $\frac{1}{1 + \text{MTBF}}$  =  $\frac{1}{1 + 1}$  = 0.5

Catastrophic Failure  
 Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

14-00-24

SHEET 10 OF 18  
#13 AGENT DISTRIBUTION  
SYSTEM (ADS)

10/15/75  
10/15/75  
10/15/75

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Brine Holding

BUILDING BLOCK

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	DATE (X10 <sup>-6</sup> HR)	CURSE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> HR)	NATH	SOURCE (*)			
13-81	Hand valve open - 141	Wide brine service			20	a. -10	2	2.483	P45		1.0	2.0	1.0	4		P45	Value 140 you get it		
13-92	Hand valve open - 141	1 ea. V/S of pump			3	"	2	2.483	P45		1.0	2.0	1.0	4		P45	"		
13-93	Check valve VT	V/S of the pump in direct of brine dryer, 1. in pie pump			4	"	2	3.014	P41		1	2	1	4		P41	Value checked good		
13-94	Press. Ind.	Local press. Reading 0 pump but hit			3	"	3	( )		NA					NA				
13-95	Hand shut	Tank level - pressure reading			3	"	2	11.905	P45		1	2	1	4		P45	Hand shut by two good		
13-96	Temp shut	Local tank temp			3	"	3	25.642	P45	NA					NA		Temperature 140 good		
13-97	Alarm	Tank level alarm			3	"	2	3.742	P45		1	2	1	4		P45	140 you good		
13-98	Pump	Pump by brine dryer (13)			4	"	2	11.055	P30		1	7	2	10		P30	Temp 140 good		
13-99	Water	Water in pump 13-98			3	"	2	11.115	P33		1	4	1	6		P33	Hand shut 140 good (assumed 140)		
13-100	Tank	Brine holding tank			3	"	2	2.035	P39		1	2.5	2	2.8		P39	Hand shut 140 good		
13-101	Crystallizer	Alone w. Brine Tanker			3	"	2	11.518	P35		1	2	1	4		P35	Hand shut 140 good		

13-99 is not data sheet for 1405

d. ELO513-600 -

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

MTBF =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
ENR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
MTTR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
ENR =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{1}$  = 1 HRS  
AVAILABILITY =  $\frac{1}{1 + \text{MTBF}}$  =  $\frac{1}{1 + 1}$  = 0.5



10-13-75  
John Dwyer  
v

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Brine drying and salt handling

BUILDING BLOCK

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA				REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	DATE (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> HR)	SOURCE (*)			
3-101	Hand valve cycle - X	Water brine and recycle brine service			10	"	2	2.413	P15		1	2	1	4	P15	Water into gun grade		
3-102	Check Valve V1	V15 recycle pumps			2	"	2	2.014	P41		1	2	1	4	P41	Water into gun grade		
3-103	pump	recycle pumps			2	"	2	17.058	P30		1	7	2	10	P30	Pump brine gun grade		
3-104	Water	pump Water for 13-10.3			2	"	2	17.058	P30		1	7	1	2	P30	Pump brine gun grade		
3-105	Temp Duct	Local Temp Duct			4	"	3	17.058		NA								
3-106	Press Duct	Local Press Duct			2	"	3	17.058		NA								
3-107	Drum dryer	Dry brine			2	"	2	17.058										
3-108	Sensor LS	? level sensor for drum dryer			2	"	2	17.058										
3-109	Alarm	Alarm for 13-10.3			2	"	2	17.058										
3-110	Speed element	Speed of drum dryers & recycle indication			2	"	2	17.058										
3-111	elevator	Bucket elevator dried brine to live and (1) & connected to P15			2	"	2	17.058										
3-112	Brine	live brine and brine (compacted)			2	"	2	17.058										
3-113	Compress	Compress dried brine			1	"	2	17.058										
3-114	Conveyor	Convey dried brine			2	"	2	17.058										

a. F11W ECUS 13-660 -

b. See Equip data sheet for MTR

\* Information is detailed in Supplemental Data Sheet

\*\* Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Mission Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$\begin{aligned}
 \text{MTBF} &= \frac{1}{\text{ENR}} \times 10^6 \text{ HRS} \\
 \text{ENR} &= \frac{\text{ENR}}{1} \times 10^{-6} \text{ HRS} \\
 \text{MTTR} &= \frac{\text{MTTR}}{1} \times 100\% \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTTR}} \times 100\%
 \end{aligned}$$



11-8-83

SHEET 12 OF 18  
#13 AGENT DESTRUCTION  
SYSTEM (ADS)

10/13/75  
1st Lt. P. J. ...  
Date 6/5/75

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Process Vent Scrubber

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION/LOCATION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL. CONSO. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10 <sup>-6</sup> )	
3-111	Flow Valve Gate - W-	Isolate pump 1 on either side			4	-12	2	7.185	P45	1	2	1	4	P45 Valve closed good
3-112	Flow Valve Gate - W-	Isolate pump 2 on either side			4	"	2	5.24	P41	1	2	1	4	P41 Valve closed good
3-113	Pump	Pump output to waste tank			2	"	2	12.051	P30	1	7	2	10	P30 Pump checked good
3-114	Valve	Valve for pumps 12-113 b			2	"	2	4.925	P48	1	4	1	6	P48 Valve closed good
3-115	Press. Ind. FI	Local press. readings			4	"	3	(1.080)	UA	1	1	1	3	UA transmitter pressure good
3-116	Press. Valve FT	Pressure transducer w. manual			4	"	2	3.465	P40	1	3	2	6	P40 Valve closed good
3-117	Level Check LT	Scrubber level			1	"	2	11.455	P45	1	2	1	4	P45 Level checked good
3-118	Level Check LT	pH Reading and remote			1	"	2	11.905	"	1	2	1	4	" Level checked good
3-119	Alarm	Alarms assoc. w. 12-117.8			2	"	2	3.145	P45	1	2	1	4	P45 Alarm checked good
3-120	Flow Valve	NaOH flow control			2	"	2	16.515	P41	1.0	2.8	1	4.8	P41 Valve closed good
3-121	Temp. Ind.	Temp. to filter syst and outlet of pump			3	"	2	16.515	"	1	2.8	1	4.8	" transmitter checked good
3-122	Flow Valve	NaOH flow leaving pump			2	"	2	25.892	P40	1	3	2	6	P40 Valve closed good
3-123	Flow Valve	NaOH flow leaving pump			1	"	2	21.415	P40	1	3	2	6	P40 Valve closed good
3-124	Flow Valve	NaOH flow leaving pump			2	"	2	12.24	P41	1	7.2	1	9.2	P41 Valve closed good
3-125	Flow Valve	NaOH flow leaving pump			4	"	2	4.735	P40	1	4	1	6	P40 Valve closed good
3-126	Flow Valve	NaOH flow leaving pump			2	"	2	0.798	P41	1	2	1	4	P41 Valve closed good
3-127	Flow Valve	NaOH flow leaving pump			1	"	2	1.111	P40	1	2.0	2	2.3	P40 Valve closed good

INA =  $\frac{1}{\text{MTBF}}$  x 10<sup>-6</sup>  
ENATM =  $\frac{1}{\text{MTTR}}$  x 10<sup>-6</sup>  
HTR =  $\frac{1}{\text{MTTR}}$  x 100%  
AVAILABILITY =  $\frac{1}{1 + \text{HTR}}$

Information is detailed in Supplemental Data Sheet 1. See OPMOS Form 1 of 10.

Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

## Cooling Tower

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA 1-1						REMARKS
ITEM NO.	ITEM NAME	FUNCTION / Location	PART NO.	MFG CODE NO.	QTY	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAIN. TIME (HR)	H X TM (X10 <sup>-6</sup> )	SOURCE (*)				
3-12-1	Head valve gate - 1st	Gate			1	4	2	2.073	P-15		1	2	1	4		P-15	Under H <sub>2</sub> O from gate 1st			
3-12-2	Check valve - V	015 pump	b		2	"	2	3.014	P-11		1	2	1	4		P-11	Value closed gate			
3-12-3	Pump	pump lig from Cooling tower surge drain	b		2	"	2	12.053	P-30		1	7	2	10		P-30	Alarm Barking gate			
3-12-4	Motor	Motor assn w. 13-12-3			2	"	2	4.555	P-39		1	4	1	6		P-39	Test 3 up gate			
3-12-5	Water flow indicator, flow gate - 1st	Control Cooling water supply and pick up drain			2	"	2	10.075		—										
3-12-6	Press - 1st	Local press @ pump 12			2	"	3	11.030		N/A					N/A					
3-12-7	Press - 2nd	press w. tower head			2	"	2	3.075		—										
3-12-8	Temp - 1st	Temp " " "			1	"	2	25.094	P-6		1	3	2	6		P-6	Transmission Temp 1st			
3-12-9	Level - 1st	Level - float			1	"	2	11.905	P-25		1	2	1	4		P-25	Test 1st level gate			
3-12-10	Speed - 1st	Cooling tower fan speed			1	"	2	17.877	P-6		1	2	1	4		P-6	Test 1st level gate			
3-12-11	Alarm	Alarm for 13-12-7, 8, 9, 10			2	"	2	3.755	P-25		1	2	1	4		P-25	Test 1st level gate			
3-12-12	Tower	Cooling Tower			1	"	2	2.335	P-24		1	6.4	1	8.4		P-24	Test 1st level gate			
3-12-13	Fan	Cooling tower fan			1	"	2	2.115	P-7		1	7.2	1	9.2		P-7	Test 1st level gate			
3-12-14	Basin (1st)	Cooling tower basin			1	"	2	1.614	P-39		1	2.5	2	2.8		P-39	Test 1st level gate			

b. Note:  $4H_2O + 2CO_2 \rightarrow 2C_2H_6O + 4H_2O + 2H_2O$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

## 11 Catastrophic Failure

2 Induction Line Shutdown Failure

4 - See Supplemental Data Sheet.

FN	$\times 10^{-6}$ /IR	ENATH	$\times 10^{-6}$
1	1.0	1.0	1.0
2	2.0	2.0	2.0
3	3.0	3.0	3.0
4	4.0	4.0	4.0
5	5.0	5.0	5.0
6	6.0	6.0	6.0
7	7.0	7.0	7.0
8	8.0	8.0	8.0
9	9.0	9.0	9.0
10	10.0	10.0	10.0
11	11.0	11.0	11.0
12	12.0	12.0	12.0
13	13.0	13.0	13.0
14	14.0	14.0	14.0
15	15.0	15.0	15.0
16	16.0	16.0	16.0
17	17.0	17.0	17.0
18	18.0	18.0	18.0
19	19.0	19.0	19.0
20	20.0	20.0	20.0
21	21.0	21.0	21.0
22	22.0	22.0	22.0
23	23.0	23.0	23.0
24	24.0	24.0	24.0
25	25.0	25.0	25.0
26	26.0	26.0	26.0
27	27.0	27.0	27.0
28	28.0	28.0	28.0
29	29.0	29.0	29.0
30	30.0	30.0	30.0
31	31.0	31.0	31.0
32	32.0	32.0	32.0
33	33.0	33.0	33.0
34	34.0	34.0	34.0
35	35.0	35.0	35.0
36	36.0	36.0	36.0
37	37.0	37.0	37.0
38	38.0	38.0	38.0
39	39.0	39.0	39.0
40	40.0	40.0	40.0
41	41.0	41.0	41.0
42	42.0	42.0	42.0
43	43.0	43.0	43.0
44	44.0	44.0	44.0
45	45.0	45.0	45.0
46	46.0	46.0	46.0
47	47.0	47.0	47.0
48	48.0	48.0	48.0
49	49.0	49.0	49.0
50	50.0	50.0	50.0
51	51.0	51.0	51.0
52	52.0	52.0	52.0
53	53.0	53.0	53.0
54	54.0	54.0	54.0
55	55.0	55.0	55.0
56	56.0	56.0	56.0
57	57.0	57.0	57.0
58	58.0	58.0	58.0
59	59.0	59.0	59.0
60	60.0	60.0	60.0
61	61.0	61.0	61.0
62	62.0	62.0	62.0
63	63.0	63.0	63.0
64	64.0	64.0	64.0
65	65.0	65.0	65.0
66	66.0	66.0	66.0
67	67.0	67.0	67.0
68	68.0	68.0	68.0
69	69.0	69.0	69.0
70	70.0	70.0	70.0
71	71.0	71.0	71.0
72	72.0	72.0	72.0
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79	79.0	79.0	79.0
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81	81.0	81.0	81.0
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83	83.0	83.0	83.0
84	84.0	84.0	84.0
85	85.0	85.0	85.0
86	86.0	86.0	86.0
87	87.0	87.0	87.0
88	88.0	88.0	88.0
89	89.0	89.0	89.0
90	90.0	90.0	90.0
91			

[illegible]

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$$\text{Availability} = \frac{\frac{\text{MTR}}{1 + \frac{\text{MTR}}{100}}}{\frac{\text{MTR}}{1 + \frac{\text{MTR}}{100}} + 100} \times 100\%$$

1014



11-10-75

SHEET 15 OF 18  
#13 AGENT DESTRUCTION  
SYSTEM (ADS)

10-10-75 Dwg.

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Process Water Distribution System

BUILDING BLOCK

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS					
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (H)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NATM (X10 <sup>-6</sup> )	SOURCE (*)	
315.1	Hand Valve gate -A-	MISC			31	17	2	1.766	P45		0.5	1	0.5	2			P45	Value too low for gnd
315.2	Check Valve	MISC			5	"	2	3.014	P41		0.5	1	0.5	2			P41	Value checked gnd
315.3	Hand Valve gate	"			14	"	2	1.766	P45		0.5	1	0.5	2			P45	Value too low for gnd

119

119

u. ECD513-660 -

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Shutdown Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$\begin{aligned}
 \text{MTBF} &= \frac{1}{\text{ENR}} = \frac{1}{\text{ENR}} \times 10^6 / \text{HR} \\
 \text{ENR} &= \frac{1}{\text{ENR}} \times 10^6 / \text{HR} \\
 \text{MTR} &= \frac{\text{ENR}}{\text{ENR}} = \frac{\text{ENR}}{\text{ENR}} \times 100\% = \frac{\text{MTR}}{1 + \text{MTR}} \times 100\% \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTR}} \times 100\% = \frac{1}{1 + \text{MTR}} \times 100\%
 \end{aligned}$$



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

Steam Distribution System

BUILDING BLOCK

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA A/					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE λ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)			
13-16	STEAM GATE VALVE	MISC			65	Q-15	2	2.415	P41		0.5	1.0	0.5	2			P45	Value checked 9/10/41	
13-17	STEAM GATE VALVE	"			26	Q-15	2	2.415	P41		0.5	1	0.5	2			P45		
13-18	STEAM GATE VALVE	"			15	Q-15	2	3.014	P41		0.5	1	0.5	2			P41	Value checked 9/10/41	
13-19	STEAM GATE VALVE	"			16	Q-15	2	3.302	P32		0.5	1.9	0.5	2.9			P32	by hand 9/10/41	
13-20	STEAM GATE VALVE	MISC			32	"	3	N/A	N/A										

120

a. P45 is -600-  
 b. See OMAIS File ref table  
 \*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - For Supplemental Data Sheet  

$$MTBF = \frac{1}{ENR} \times 10^6 \text{ HRS}$$

$$ENR = \frac{1}{ENR} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{MTTR} \times 100\% \times \text{HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$



4-1-16

SHEET 11 OF 18  
#13 AGENT DESTRUCTION  
SYSTEM (AUS)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

1100c Supply Air System

BUILDING BLOCK

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
								RATE (X10 <sup>-6</sup> /HR)	INFO. SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	NATH (X10 <sup>-6</sup> )	SOURCE (*)
120	Hand Valve				5	12-11	2	1.766	P45		0.5	1.0	0.5		P45
121	Control Valve				3	"	2	16.505	P41		0.5	1.4	0.5		P41
122	Pressure Switch				5	"	2	3.302	P32		0.5	1.1	0.5		P32
123	Alarm Relay Control				4	"	2	1.991	See Remarks		0.5	2	0.5		P32
124	Control Valve				2	"	2	1.66	P41		0.5	1	0.5		P41
125	Pressure Switch				1	"	2	1.201	P41		0.5	1	0.5		P41
126	Control Valve				1	"	2	1.342	P41		0.5	3.2	0.5		P41
127	Control Valve				1	"	2	10.620	P32		0.5	3.5	1		P32
128	Control Valve				2	"	2	2.412	P40		0.5	1.5	1		P40
129	Control Valve				1	"	2	2.413	P40		0.5	1.5	1		P40
130	Control Valve				1	"	2	3.742	P45		0.5	1.0	0.5		P45
131	Control Valve				3	"	2	2.718	P17		0.5	3.6	0.5		P17
132	Control Valve				1	"	2	2.511	P37		0.5	1.0	0.5		P37
133	Control Valve				3	"	2	4.515	P18		0.5	2	0.5		P18

12. ECUIS - 352 - DWG. DATED 9/17/15 NOT FINAL SIZE

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Strophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$MTBF = \frac{1}{\frac{1}{ENR} + \frac{1}{ENR}}$ 
 $MTTR = \frac{1}{\frac{1}{ENR} + \frac{1}{ENR}}$ 
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$

$ENR = \frac{1}{\frac{1}{ENR} + \frac{1}{ENR}}$ 
 $ENR = \frac{1}{\frac{1}{ENR} + \frac{1}{ENR}}$ 
 $ENR = \frac{1}{\frac{1}{ENR} + \frac{1}{ENR}}$

AGENT DESTRUCTION SYSTEM  
EXHAUST AIR SYSTEM

SHEET 15 OF 18  
11-11-76

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS			
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	NA TM ( $\times 10^{-6}$ )	SOURCE (*)
18.1	AGENTS VALVES	C			6	A-02	2	4.941	See 18.2.2.4		0.5	2	0.5	3		See 18.2.2.4	Under 8/14 gnd + maintenance
18.2	EXHAUST VALVE	C			11	A-02	2	1.66	P41		0.5	1	0.5	2		P41	Under 8/14 gnd
18.3	FLW	C			7	A-02	2	1.224	P17		0.5	3.6	0.5	4.6		P17	Old Center gnd
18.4	FLW Motor	C			7	A-02	2	4.155	P18		0.5	2	0.5	3		P18	Under 8/14 gnd
18.5	Backhouse				1	A-02	2	2.235	See 18.2.2.4		1	10	2	13		EST	Flw + Motor + Flw + 12.4 + 4.155 + 1.235
18.6	Flw. res				10	A-02	2	1.201	P11		0.5	1	0.5	2		P21	Flw + 8/14 gnd
18.7	Flw. res				1	A-02	2	3.244	P15		0.5	1	0.5	2		P25	Flw + 8/14 gnd

122

ASSUMPTION  
THE FIL SYSTEM IS # 23  
IS IN ADDITION TO THE ABOVE

ASSUMPTION  
THE FL SYSTEM IS IN ADDITION TO THE ABOVE

1. ECUS 18-352 -  
2. 4-22-76  
\* Information is detailed in Supplemental Data Sheet  
\*\* Failure Consequence Code  
1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

6. 5 filters, 1 in, 1 out, 12 2 samples  
in per 1000  
c. 1000 + material change MTBF =  $\frac{1}{1000}$  HRS  
in per 1000  
d. see causes of failure

ENR =  $\frac{1}{1000}$   $\times 10^{-6}/\text{HRS}$  INATM =  $\frac{1}{1000}$   $\times 10^{-6}$   
MTTR =  $\frac{1}{1000}$  HRS  
AVAILABILITY =  $\frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{1}{1000}} \times 100\% = 99.9\%$

# SUMMARY - BUILDING BLOCK:

#13 AGENT DESTRUCTION SYSTEM (ADS)

PARALLEL ITEM - (WFO QUS2)

with observed

AS FROM QUS2  
PAR ITEM3 SUMMARY

ENDTY MAINT

ENDTY MAINT

ENDTY

ITEM

NO.

SUBSYSTEM

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SUMMARY - BUILDING BLOCK: #1. AGENT DESTRUCTION SYSTEM (ADS)

$$\Delta_1 = \Delta_{nd}$$

$$\Delta_2 = \Delta_{nd} + \Delta_{in}$$

13.1 - UNDERMINING AREAS

1. 1 Gate Valve in Par. w. S-V, 2 Places, and Diaph. gate valve

ND 2.483

$$2.483 \times 2 + 5.302 = 8.208$$

$$\Delta_1 = 2.483 + 5.302 = 8.208 \times 2 = 16.4$$

NAT 2.483 x 4 = 9.932

$$2.483 \times 2 \times 4 + 3.302 \times 5.8 = 39.0$$

$$\left[ \frac{1}{4.027} - \frac{1}{2.483 \times 5.8} \right] = 1.4$$

$$\Delta_2 = 3.932 + 39.0 - 9.4 = 39.5 \times 2 = 79$$

13.2 STORAGE - No Parallel stems

13.3 STORAGE and DIRECTION

1. 2 Ball valves, 1 Check valve, pump, motor in parallel w. same

$$2 \times 3.027 + 3.014 + 12.058 \div 4.825 = 25.951 \quad \frac{1}{2} \times 25.951 = 12.975$$

$$\Delta_1 = 25.951 \times 2 = 51.9$$

$$2 \times 3.027 \times 4 + 3.014 \times 4 \times 12.058 \times 10 + 4.825 \times 6 = 185.802 \times \frac{1}{2} = 92.9$$

$$\Delta_2 = 185.802 \times 2 = 371.6$$

2. 1 Ball valve in par w. 2 Ball valves + Diaph. gate valve

ND 3.027

$$3.027 \times 2 + 3.302 = 9.356$$

$$\Delta_1 = \left[ \frac{1}{3.027} - \frac{1}{9.356} \right] = 2.8 \times 10^{-6}$$

$$\Delta_2 = 3.027 + 9.356 = 12.383$$

NAT 3.027 x 4 = 12.108

$$3.027 \times 2 \times 4 + 3.302 \times 5.8 = 43.368$$

$$\Delta_1 = \left[ \frac{1}{12.108} - \frac{1}{43.368} \right] = 11.4$$

$$\Delta_2 = 12.108 + 43.368 = 55.476$$

Storage Dis.  $\Sigma \Delta_1 = 44.4$

$$\Sigma \Delta_2 = 291.8$$



DATA UNKNOWN

SUMMARY - BUILDING BLOCK: #13 AGENT DESTRU ION SYSTEM (ADS)

AS FROM CHALC. STATION  
FIRE STATION

ITEM NO. SUBSYSTEM

ENDT<sup>11</sup> MAINT<sup>11</sup>  
X10<sup>6</sup> FACTOR

ENDT<sup>11</sup> MAINT<sup>11</sup>  
X10<sup>6</sup> FACTOR

AGENT FACTOR  
MUS GIB VX

13.1	UNDERGROUND	127.8 ✓	692.1 ✓ 2X	692.1 ✓ 2X	1/3 ✓ 1/3	1
13.2	STORAGE	145.6 ✓	921.9 ✓ 2X	921.9 ✓ 2X	1/2 ✓ 1/2	1
13.3	STORAGE & DRAIN	465.4 ✓	2865.2 ✓ 2X	2865.2 ✓ 2X	2/3 ✓ 2/3	1
13.4	ACID STATION	275.0 ✓	1675.1 ✓ 2X	1675.1 ✓ 2X	0 ✓ 1/2	1
13.5	WATER - 1	252.2 ✓	1454.3 ✓ 2X	1454.3 ✓ 2X	0 ✓ 0	1
13.6	WATER - 2	800.2 ✓	5446.8 ✓ 2X	5446.8 ✓ 2X	0 ✓ 0	1
13.7	GASX NEUR	402.2 ✓	5013.1 ✓ 2X	5013.1 ✓ 2X	0 ✓ 1	1
13.8	WASTE NEUR	470.6 ✓	2690.2 ✓ 2X	2690.2 ✓ 2X	1 ✓ 1	1
13.9	DRINK HOLD	213.5 ✓	370.9 ✓ 2X	370.9 ✓ 2X	1 ✓ 1	1
13.10	PHONE DEPT	289.2 ✓	252.7 ✓ 2X	252.7 ✓ 2X	1 ✓ 1	1
13.11	SALT HOUSE	259.1 ✓	1456.4 ✓ 2X	1456.4 ✓ 2X	1 ✓ 1	1
13.12	PROCESS JEN SEAR	93.4 ✓	540.5 ✓ 2X	540.5 ✓ 2X	1 ✓ 1	1
13.13	WATER DISSEPS	97.4 ✓	224.8 ✓ 1X	224.8 ✓ 1X	1 ✓ 1	1
13.14	PUMP AIR	105.2 ✓	337.3 ✓ 1X	337.3 ✓ 1X	0 ✓ 0	1
13.15	PUMP WATER	103.4 ✓	206.7 ✓ 1X	206.7 ✓ 1X	1 ✓ 1	1
13.16	STEAM DISSEPS	66.1 ✓	134.9 ✓ 1X	134.9 ✓ 1X	1 ✓ 1	1
13.17	WATER SINKY AIR	153.2 ✓	465.7 ✓ 1X	465.7 ✓ 1X	1 ✓ 1	1
13.18	EXT. AIR SYSTEM	64.1 ✓	261.5 ✓ 1X	261.5 ✓ 1X	1 ✓ 1	1

Σ 4405.6 ✓ ΣN<sub>1</sub>TA = 14483.4 ✓ 23765.9 ✓ 35993.0 ✓  
ΣN<sub>2</sub>TA = 7248.3 ✓ 3397.2 ✓ 1919.1 ✓  
A 9057 ✓ 9768 ✓ 9653 ✓  
MIBT 4444.8 ✓ 244.4 ✓ 209.9 ✓  
MIRA 6.44 ✓ 7.00 ✓ 7.55 ✓

(1) AS LISTED ON PUMP DATA SHEETS

AS LISTED ON PUMP DATA SHEETS



SUMMARY - BUILDING BLOCK: #1. AGENT DESTRUCTION SYSTEM (ADS)

PARALLEL ITEMS

13.4 - AGENT STORAGE - NO PARALLEL ITEMS

13.5 - VX AND AGENT CHLORINATION - 1 - NO PARALLEL ITEMS

13.6 - VX AND AGENT CHLORINATION - 2 - NO PARALLEL ITEMS

13.7 - C/P/VX CHLORINATION - NO PARALLEL ITEMS

13.8 - W/STRE CHLORINATION - NO PARALLEL ITEMS

13.9 - BRINE FILLING - NO PARALLEL ITEMS

13.10 - BRINE DRYING & SALT HANDLING - NO PARALLEL ITEMS (USE SAME DATA AS 13.9)

126 13.11 PROCESS VENT SCREEN

1. (FILL + MOTOR + MOVING + DRYING) 2 IN PARALLEL

$$M_1 = (1,229 + 4,825 \times 2 + 798) = 11,672 \quad 11,672 \times \frac{1}{2} = 5,836$$

$$A_1 = 11,672 \times 2 = 23,344$$

$$M_2 = \{ 6,229 \times 9.2 + 4,825 \times 2 \times 6 + 798 \times 4 \} = 72,414 \quad 72,414 \times \frac{1}{2} = 36,207$$

$$A_2 = 72,414 \times 2 = 144,828$$

2. (24V + C/P/VX + FILL + HOT) 2 IN PAR.

$$M_3 = (2,424.85 + 3,014 + 12,058 + 4,825) = 24,863 \quad 24,863 \times \frac{1}{2} = 12,431.5$$

$$A_3 = 24,863 \times 2 = 49,727$$

$$M_4 = (2,424.85 \times 4 + 3,014 \times 4 + 12,058 \times 4 + 4,825 \times 6) = 181,445 \quad 181,445 \times \frac{1}{2} = 90,722.5$$

$$A_4 = 181,445 \times 2 = 362,890$$

$$\Sigma A_i = 498,940$$

SUMMARY - BUILDING BLOCK: #1. AGENT DESTRUCTION SYSTEM (ADS)

PARALLEL ITEMS (cont.)

13.12 Cooling Tower

1. (Pump + Hot + HV + 54-4-4) 2 in Parallel

$$N1 \quad (12.055 + 4.835 + 2.483 + 2.014) = 22.38, \quad \Delta_1 = 22.38 \times 2 = 44.76 = 44.8$$

$$N1T_1 \quad (12.055 \times 10 + 4.835 \times 6 + 2.483 \times 4 + 3.014 \times 4) = 171.58, \quad \Delta_2 = 171.58 \times 2 = 343.16 = 343.2$$

2. 2 HV in Parallel

$$N1 \quad 2.483 \times \frac{2}{3} = 1.655, \quad \Delta_1 = 2.483 \times 2 = 4.966 = 4.97$$

$$\Delta_2 = 2.483 \times 4 \times 2 = 19.864 = 19.9$$

13.13 Cooling Water Distr System - No Parallel Items

13.14 Plant Air

1. (Heater Dryer + 2 CAV) 2 in Parallel

$$N1 \quad 1.616 + 2 \times 3.014 = 7.644, \quad \Delta_1 = 7.644 \times 2 = 15.288 = 15.3$$

$$N1T_1 \quad 1.616 \times 14 + 2 \times 3.014 \times 2 = 34.68, \quad \Delta_2 = 34.68 \times 2 = 69.36 = 69.4$$

2. (2HV + Heater) 2 in Parallel 2 phases

$$N1 \quad 1.766 \times 2 + 1.201 = 4.733, \quad \Delta_1 = 4.733 \times 2 = 9.466 = 9.5$$

$$N1T_1 \quad 1.766 \times 2 \times 2 + 1.201 \times 2 = 9.466, \quad \Delta_2 = 9.466 \times 2 = 18.932 = 18.9$$

13.15 Plant Water - No Parallel Items

SUMMARY - BUILDING BLOCK: #1 AGENT DESTRUCTION SYSTEM (ADS)

PARALLEL ITEMS (cont.)

13-16 Stream Discharge System

1. GLOBE INLET IN PPA W. 2 HV + DISPERSED CASE VALUE 15 places

$$N1 \quad 2.483 \times 2 + 3.302 = 8.267 \quad \Delta = \left[ \frac{1}{2.483} + \frac{1}{3.302} - \frac{1}{2.483 \times 3.302} \right] = 2.32$$

$$\Delta_1 = (2.483 + 3.302 - 2.32) \times 13 = 10.96$$

$$N1 \quad 2.483 \times 2 = 4.966 \quad \Delta = \left[ \frac{1}{2.483} + \frac{1}{4.966} - \frac{1}{2.483 \times 4.966} \right] = 1.72$$

$$\Delta_2 = (4.966 + 4.966 - 1.72) \times 13 = 256.8$$

2. GLOBE INLET IN PPA W. 2 HV + 3 CHV

$$N1 \quad 2.483 \times 2 + 3.014 = 7.98 \quad \Delta = \left[ \frac{1}{2.483} + \frac{1}{3.014} - \frac{1}{2.483 \times 3.014} \right] = 2.31$$

$$\Delta_1 = (2.483 + 3.014 - 2.31) \times 13 = 106.0$$

$$N1 \quad 2.483 \times 2 = 4.966 \quad \Delta = \left[ \frac{1}{2.483} + \frac{1}{4.966} - \frac{1}{2.483 \times 4.966} \right] = 1.62$$

$$\Delta_2 = (4.966 + 4.966 - 1.62) \times 13 = 212.0$$

3. (HV + CHV IN) 2 in. Parallel

$$N1 \quad 2.483 + 3.014 = 5.497 \quad \Delta = 5.497 \times 2 - 2.483 \times 3.014 = 7.3$$

$$N1 \quad 2.483 \times 2 + 3.014 \times 2 = 11.0 \quad \Delta_2 = 11.0$$

4. (HV + Discharge Inlet) 3 in. Parallel

$$N1 \quad 2.483 + 3.302 = 5.785 \quad \Delta = 13.234 \times 3 - 13.234 \times 6 = 32.5$$

$$N1 \quad 2.483 \times 2 + 3.302 \times 2 = 11.0 \quad \Delta_2 = 29.44 \times 3 = 72.3$$

$$\Delta_1 = 255.4$$

SUMMARY - BUILDING BLOCK: #13 SENT DESTRUCTION SYSTEM (ADS)

PARALLEL ITEMS (cont.)

13.17 - HVAC Supply Air System - No Parallel Items

13.18 - EXHAUST AIR SYSTEM

1. (5 FANS, MOTOR, 2 DAMPERS) 2 IN PARALLEL

$$N_A (5 \times 12.201 + 1.229 + 4.825 + 2 \times 166) = 12.301 \quad \Delta_1 = 12.391 \times 2 = 24.782 \times \frac{1}{2} = 12.391 \times \frac{1}{2} = 10.52$$

$$N_{M_1} (5 \times 12.201 \times 2 + 1.229 \times 466 + 4.825 \times 3 + 2 \times 166 \times 2) = 32.89 \quad \Delta_2 = 32.8 \times 2 = 65.6 \times \frac{1}{2} = 32.8$$

2. (FAN + MOT. DAMPER) 2 IN PARALLEL 2 PIPES

$$N_A (1.229 + 4.991) = 6.22 \quad \Delta_1 = (6.22 \times 2 - 6.22 \times \frac{2}{3}) \times 2 = 16.6$$

$$N_{M_1} (1.229 \times 466 + 4.991 \times 3) = 20.63 \quad \Delta_2 = (20.63 \times 2 - 20.63 \times \frac{2}{3}) \times 2 = 55.0$$

$$\Sigma \Delta_1 = 53.1$$

$$\Sigma \Delta_2 = 78.7$$



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #14 EXPLOSIVE TREATMENT SYSTEM (EBT) ETS

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	323.7	2538.7	2246.8	5.70	.99
Rocket, 115mm, M55	VX	Comp B	M28	"	"	"	"	"
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	323.9	2538.7	2246.8	5.70	.99
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	"	"	"	"	"
Projectile, 155mm, M104	HD	Tetrytol	None	"	"	"	"	"
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6					

\*MUNITION DEMILITARIZATION PROCESS FLOW



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #14 EXPLOSIVE TREATMENT SYSTEM (EB)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>A</sub> TM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MQ-1	GB	None	None					
Tank, Spray, TMU-28/B	VX	None	None					
Ton Container	GB	None	None					
Tone Container	VX	None	None					
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None					

SHEET 1 OF 1

SUPPLEMENTAL DATA

BUILDING BLOCK  
# 14 EXPLOSIVE TRE  
SYSTEM (ETS)  
\_\_\_\_\_

A. DESCRIPTION

1. SOURCE

a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
\_\_\_\_\_ sheets  
\_\_\_\_\_

B. FAILURE DATA

1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available  
\_\_\_\_\_

C. MAINTENANCE DATA

1. ESTIMATE SOURCE

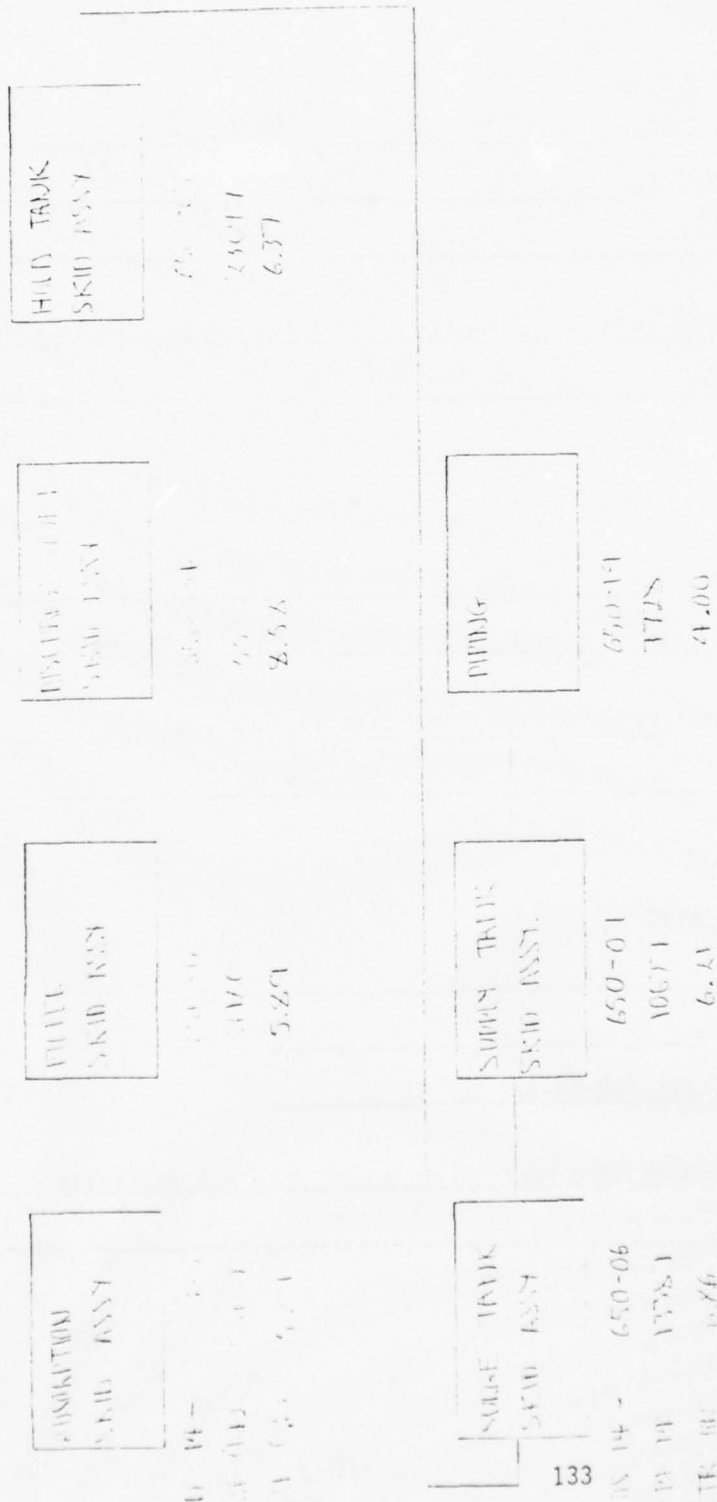
a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available  
\_\_\_\_\_

D. GENERAL REMARKS

# BUILDING BLOCK: #14 EXPLOSIVE TREATMENT SYSTEM (ETS)

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revised 11/1/15  
SHEET 1 OF 3  
EXPLOSIVE TREATMENT  
SYSTEM (EB)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #14

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MSG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA 1 X					REMARKS
							FAIL CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> )	
1	Absorption Skid Assy	Absorption Column & Sumner			3	4-02 9/19/14	1	1.020	P235		1.0	2.0	1.0	4.0	P235
11	Gauge, Press	0-15 PSI Gauge, Line Pk to S AD Column	-0901	-	3	4-02	2	3.945	P231		1.0	2.8	1.0	4.8	P231
12	Column, Absorption	Absorbs Dissolved Explos & Agent Contamin.	-1699	-	1	4-02	2	6.839	P44		1.0	5.0	2.0	8.0	P44
13	Valve, Actuator	Auto Valve Allow Spent Decant to PMS to ADS													
14	Filter Skid Assy	MECH Column & Sumner													
21	Gauge, Press	Same as 1.1			3	4-03 10/2/11	2	1.020	P235		1.0	2.0	1.0	4.0	P235
22	Filter & Bag	Filter Sludge and Large Part. MECH Filter	40000001 PMS ADS (GA)	80711	2	4-03	2	3.945	P231		1.0	2.8	1.0	4.8	P231
31	Valve, Actuator	Same as 1.3 - Decant to Sumner Tank	-1659	-	1	4-03	2	6.859	P44		1.0	5.0	2.0	8.0	P44
13	Discharge Pump Skid Assy	Support Discharge Pump													
31	Pump, Centrif.	Pump Spent Decant/Sumner		76711	1	4-04 10/2/11	2	17.055	P30		1.0	7	2	10	P30
32	Gauge, Press	Pump Discharge Press-Local	-1199	-	1	4-04	2	1.020	P235		1	2	1	4	P235
33	Motor	Motor for Pump		-	1	-	2	4.325	P36		1.0	4.0	1.0	6	P36

6. only 2 columns in operation

Information is detailed in Supplemental Data Sheet (if not here)

α. 2025/14- GSD

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period

4 - See Supplemental Data Sheet

ENR = 53.172 x 10<sup>-6</sup>/HR

ENR = 252.31 x 10<sup>-6</sup>

MTBF = 1 / ENR

MTTR = ENR / ENR

AVAILABILITY = 1 / (1 + MTTR x 100%)

ENR = 53.172 x 10<sup>-6</sup>/HR

ENR = 252.31 x 10<sup>-6</sup>

MTBF = 1 / ENR

MTTR = ENR / ENR

AVAILABILITY = 1 / (1 + MTTR x 100%)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #14 SYSTEM (EB)									
FAILURE DATA									
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (P)	FAIL CONSEQ (M)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (P)
DESCRIPTION									
MAINTAINABILITY DATA 2 X									
REMARKS									
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (P)	FAIL CONSEQ (M)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (P)
4-4	HOLD TANK	SUPPORT							
4-5	SHUT DOWN								
4-6	VALVE, ACTIVATION								
4-7	PROBE, LEVEL								
4-8	OVERFILL, PROBE								
4-9	TANK								
4-10	SHUT DOWN								
4-11	SHUT DOWN								
4-12	SHUT DOWN								
4-13	SHUT DOWN								
4-14	SHUT DOWN								
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4-72	SHUT DOWN								
4-73	SHUT DOWN								
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4-79	SHUT DOWN								
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4-81	SHUT DOWN								
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4-88	SHUT DOWN								
4-89	SHUT DOWN								
4-90	SHUT DOWN								
4-91	SHUT DOWN								
4-92	SHUT DOWN								
4-93	SHUT DOWN								
4-94	SHUT DOWN								
4-95	SHUT DOWN								
4-96	SHUT DOWN								
4-97	SHUT DOWN								
4-98	SHUT DOWN								
4-99	SHUT DOWN								
4-100	SHUT DOWN								

Information is detailed in Supplemental Data Sheet (See Note and THIS SHEET)  
 FAILURE CONSEQUENCE CODE  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet

INA =  $\frac{1}{1 + \frac{MTR}{100}} \times 10^{-6}$  / HR  
 ENA =  $\frac{1}{1 + \frac{MTR}{100}} \times 10^{-6}$  / HR  
 MTR =  $\frac{1}{1 + \frac{MTR}{100}} \times 100\%$



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

ITEM NO.	ITEM NAME	DESCRIPTION	FAILURE DATA				MAINTAINABILITY DATA				REMARKS					
			PART NO. S/N	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA		DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10 <sup>-6</sup> )	SOURCE (%)
6.6	SUPPLY TANK SKID ASSY	SUPPLY TANK SUPPORT	-	16717	1	A-07	2									UNDER GRD
6.1	PUMP, CENTR	SEALING PUMP				A-07										SEE 4.1
6.2	AGITATOR	STIR TANK	FR6-2C	80043	1	A-07	2									UNDER GRD
6.3	VALVE, ACTUATOR	SAME AS 14-1.3	-1699	-	1	A-07	2									UNDER GRD
6.4	PROBE, LEVEL	TANK LIQ LEVEL	-15923	-	1	A-07	2									UNDER GRD
6.5	PROBE, PH	PH PROBE	-1449	-	1	A-07	2									"
6.6	PROBE, TEMP	TEMP. MEAS.	-1394	-	1	A-07	2									"
6.7	DRIVER	DRY FEED DRIVER	-1294	-	1	A-07	2									CAVE
6.8	OVER, OVERFILL	OVERFILL LEVEL	-1294	-	1	A-07	2									UNDER GRD
6.9	VALVE, DISCHARGE	PUMP DISCHARGE	-1194	-	1	A-07	2									UNDER GRD
6.10	HEATER	IMMERSION HEATER FOR TANK	-0844	-	1	A-07	2									UNDER GRD
6.11	TANK	SUPPLY (DECOU) TANK	-1801	-	1	A-07	2									SEE 4.5
7.1	PPH/MG	VALVE, RISING STEM S/B	250.100	0166	2	A-19	2									UNDER GRD
7.2	VALVE, SOURCE	GLASS FRONT FLOW	SEE 2-14	96711	6	A-19	2									SEE 4.5
7.3	JOINT EXPANSION	EXPANSION CONNECTION	"	"	9	A-19	2									SEE 4.5
7.4	VALVE, PUG	5/8 VALVE	"	"	32	A-19	2									SEE 4.5

- Information is detailed in Supplemental Data Sheet (15-16) on this slide

Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

4 - See Supplemental Table 1

WALL CMT 12-8-87

SUMMARY - BUILDING BLOCK: #14 EXPLOSIVE TREATMENT SYSTEM (ETS)

Sub System	ITEM	SUM X10 <sup>-6</sup>	SUM Tm X10 <sup>-6</sup>	UNIT
DESCRIPTION	1	17.8	104.8	2x
Sub Assy				
Water Sump	2	17.8	104.8	2x
Assy				
Refrigerant Sump	3	17.9	153.6	2x
Assy				
Low Temp Sump	4	42.2	269.0	2x
Assy				
Water Tank	5	74.7	512.2	2x
Sub Assy				
Water Tank	6	94.1	584.7	2x
Sub Assy				
Water Tank	7	129.4	517.7	2x
Sub Assy				
TOTAL		393.9	2246.8	
				NOTE 2538.7
				NOTE 5.70
				A 99.73

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #15 PROJECTILE DEMIL MACHINE (PDM)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NATM	MTTR	AVAIL
*M55 ROCKET, GB/VX								
Rocket, 115mm, M55	GB	Comp B	M28	NA	NA	NA	NA	NA
Rocket, 115mm, M55	VX	Comp B	M28	NA	NA	NA	NA	NA
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121A1	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M122	GB	None	None	NA	NA	NA	NA	NA
Projectile, 8", M425	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121A1	VX	None	None	NA	NA	NA	NA	NA
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	4470.142	223.71	3665.712	12.65	94
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	2043.0145	339.21	37250.548	12.64	94
Projectile, 155mm, M104	HD	Tetrytol	None	2043.0145	339.21	37250.548	12.64	94
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	NA	NA	NA	NA	NA
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	NA	NA	NA	NA	NA
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	NA	NA	NA	NA	NA

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #15 PROJECTILE DEMIL MACHINE (PDM)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVAIL F571
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NA	NA	NA	NA	NA
Tank, Spray, TMU-28/B	VX	None	None	NA	NA	NA	NA	NA
Ton Container	GB	None	None	NA	NA	NA	NA	NA
Tone Container	VX	None	None	NA	NA	NA	NA	NA
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	NA



SHEET 1 OF 1

SUPPLEMENTAL DATA

BUILDING BLOCK

#15 PROJECTILE

DEMIL MACHINE

(PDM)

A. DESCRIPTION

1. SOURCE

a. DRAWING NO. SEE ATTACHED DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

B. FAILURE DATA

1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

C. MAINTENANCE DATA

1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

D. GENERAL REMARKS

• FAILURE RATE FOR BLADES (200 X 10<sup>-6</sup> FOR PROJECTILE SAW & 200 X 10<sup>-6</sup> FOR HURSTER SAW) IS BASED ON SAME MATERIAL AS USED FOR RT # 6 RADIUM. MAINT. TIME EST IS MINIMUM TIME.  
• SUPPLEMENTAL CHARGE EQUIPMENT (ITEM 2) IS LISTED AS 140

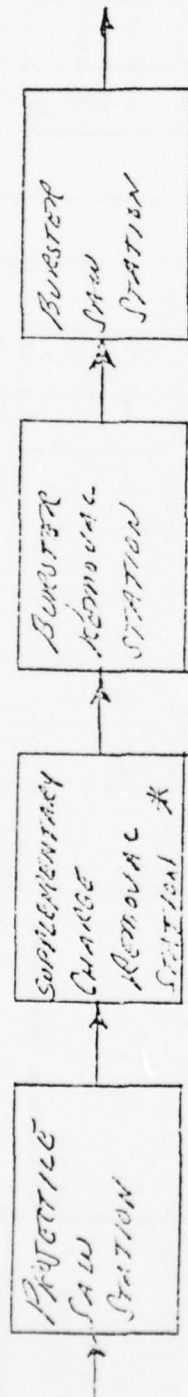


BUILDING BLOCK #15 PROJECTILE DEMIL MACHINE (PDM)

DRAWINGS:

15-205-04	27 FEB 73	REVISION 3	9 JUN 75
05	27 DEC 74		
15-302-01	24 MAY 75	REVISION 3	11 APR 75
-02	24 MAY 75	REVISION 2	23 JUN 75
-08	24 MAY 75		
-11	24 MAY 75	REVISION 1	5 SEP 73
-12	3 JAN 74	REVISION 2	9 DEC 74
-13	21 FEB 74		
-14	28 JAN 74		
-15	12 FEB 74		
-16	29 JUL 74		
-18	18 OCT 74		
-19	12 MAY 75		
-03	24 MAY 75	REVISION 3	1 AUG 75
-04	24 MAY 75	REVISION 6	26 JUN 75
-05	24 MAY 75	REVISION 3	10 JAN 75
15-303-01	31 MAY 75		
-06	31 MAY 75		
15-304-01	15 NOV 72	REVISION 6	11 SEP 75
-10	23 AUG 72		
-11	4 NOV 72	REVISION 2	9 AUG 75
-12	13 NOV 72	REVISION 2	19 APR 74
-15	15 NOV 72	REVISION 1	9 NOV 73
-20	12 NOV 72	REVISION 2	23 APR 74
-23	20 FEB 73		
-24	8 MAR 73		
-25	15 JAN 73	REVISION 2	11 SEP 73
-27	6 NOV 72		
-30	4 JUN 75		
15-532-1/1	30 JUN 73		
15-533-1/5	29 JAN 73		
-2/5	29 JAN 73		
-3/5	30 JAN 73		
-4/5	9 AUG 73		
-5/5	9 AUG 73		
15-607-03	3 FEB 75	REVISION 1	11 FEB 75

BUILDING BLOCK #15 PROJECTILE DEMIL MACHINE (PDM)  
FLOW CHART



\* NOT USED  
AT TEAD



DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				MACHINE (P/W)				
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (HR)	N A T M $\times 10^{-6}$	SOURCE (*)	REMARKS
CONVENE, HALLER'S	DP Clamp	312045, 150	WARRIOR	4	0105	3										
CUNNING, HND		200055 2400	CUNNING	1	0106	2	15.228	P15	15.228				40	15.228	P15	After Laid HND End
CUNNING, HND	DP MENDING JAWS	200055 200	SWIFT	2	0107	2	15.228	P15	30.456				40	15.228	P15	After Laid HND End
GRUSE		115	WARRIOR	1	0201	3										
GRUSE, HND, HND, HND		PK 600, 94	WARRIOR	1	0202	2	0.476	P45	0.476				20	0.476	P45	Save HND HND HND End HND
HND		421-2	WARRIOR	3/4	3604	2	.240	P24	.240				20	.430	P24	HND End HND
HND		421-8	WARRIOR	1/4	3605	2	.240	P24	.240				20	.430	P24	HND End HND
SEALS	GRASMAN DP			2	Plan	3										
WARRIOR, HND, SOL	After Survey for DP HND, SOL			1	Plan	2	19.623	P35	19.623				23	15.684	P45	WARRIOR HND SOL HND

$$\Delta \text{EN A} = 74.469 \times 10^{-6} / \text{HR} \quad \Delta \text{ENATH} = 274.5744 \times 10^{-6}$$
$$\Delta \Sigma A = 74.469 \times 10^{-6} / \text{HR} \sim$$

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[illegible]

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[illegible]

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•Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure

## 2 - Production Line Shutdown Failure





EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK 115 PROJECTILE DEMIL MACHINE (PDM)														
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			REMARKS					
						FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)						
MAINTAINABILITY DATA														
					DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)						
								NA	NA					

# CALCULATIONS BUILDING BLOCK #15 PROJECTILE DEMIL MACHINE

IST Item No.	PROJ ENR	INT SF ENR PROJ ENR	DEMIL ENR PROJ ENR	PROJ ENR PROJ ENR	PROJ ENR PROJ ENR	PROJ ENR PROJ ENR
1	292.441	-	765.203	144.500	144.500	144.500
3	74.168	-	277.577	-	-	-
4	299.885	-	169.376	-	-	-
14	102.974	121.212	674.300	763.636	-	-
SUB TOTAL	669.786	121.212	2753.505	323.636	13.25	3720.544
	32.5	2903.065	14131.328	14131.328	14131.328	14131.328
	50	4470.142	155.243	155.243	155.243	155.243
2	47.162	-	-	-	-	-

REFER TO NOTES

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NATM	MTTR	AVAIL ABLE
*M55 ROCKET, GB/VX								
Rocket, 115mm, M55	GB	Comp B	M28	NA	NA	NA	NA	NA
Rocket, 115mm, M55	VX	Comp B	M28	NA	NA	NA	NA	NA
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360 50/HK	GB	None	None	5753.993	194.78	53120.02	10.35	.949
Projectile, 155mm, M121A1 32.5/HK	GB	None	None	3537.6852	282.51	36571.318	10.33	.964
Projectile, 155mm, M121 32.5/HK	GB	None	None	3537.6852	282.51	36571.318	10.33	.964
Projectile, 155mm, M122 32.5/HK	GB	None	None	3537.6852	282.51	36571.318	10.33	.964
Projectile, 5", M426 20/HK	GB	None	None	2400.895	416.51	24750.822	10.31	.976
Projectile, 155mm, M121A1 12.5/HK	VX	None	None	3537.6852	282.51	36571.318	10.33	.964
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360 50/HK	GB	Tetrytol	M1	5733.973	194.78	53120.02	10.35	.949
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110 32.5/HK	H	Tetrytol	None	3025.117	330.54	31461.545	10.47	.930
Projectile, 155mm, M104 32.5/HK	HD	Tetrytol	None	3025.117	330.54	31461.545	10.47	.930
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	NA	NA	NA	NA	NA
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1 32.5/HK	HD	Tetryl	M6	4342.653	230.27	45346.522	10.44	.933
Cartridge, Mortar, 4.2", M2/M2A1 32.5/HK	HT	Tetryl	M6	4342.653	230.27	45346.522	10.44	.933

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NA	NA	NA	NA	N
Tank, Spray, TMU-26/B	VX	None	None	NA	NA	NA	NA	N
Ton Container	GB	None	None	NA	NA	NA	NA	N
Tone Container	VX	None	None	NA	NA	NA	NA	N
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	N
PROJECTILE/ CARTRIDGES, GB WITHOUT BURSTERS WITH WELDED BURSTER WALLS								
Projectile 155mm M121, 7K2 22.5/HR	GB			3903.453	256.18	59707.961	10.17	.961
Cartridge 105mm M1360, 7K2 50/HR	GB			5593.615	175.64	59945.615	10.18	.945

SUPPLEMENTAL DATA

BUILDING BLOCK

# 7 1 PD

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. SEE ATTACHED DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

## D. GENERAL REMARKS

SEE ATTACHED SHEET



*DRAWINGS* BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

18-202

APR 75

18-307-01

74

-02

NOT LEGIBLE

-03

" "

-04

3 MAY 74

-05

NOT LEGIBLE

-06

25 MAY 74

-07

1 JUL 74

-08

15 JUL 74

-09

NOT LEGIBLE

-10

17 JUL 74

-11

18 JUL 74

-12

22 JUL 74

-13

15 OCT 71

-14

18 OCT 71

-15

5 OCT 71

-16

31 JUL 74

-17

1 AUG 74

-18

17 JUN 74

-19

18 JUN 74

-20

13 AUG 74

-21

14 AUG 74

-22

74

-23

5 JUL 74

-24

4 SEP 74

-25

21 AUG 74

-26

23 AUG 74

-27

3 SEP 74

-28

13 SEP 74

-29

15 SEP 74

-30

31 OCT 74

-31

29 OCT 74

-32

31 OCT 74

-33

23 JAN 75

-34

24 JAN 151

-35

27 JAN 75

BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

DRAWINGS (CONTINUED):

18-307-36	27 JAN 74
- 37	4 FEB 74
- 38	NOT LEGIBLE
- 39	8 FEB 75
- 40	2 FEB 75
- 41	20 FEB 75
- 42	26 FEB 75
- 43	27 FEB 75
- 44	28 FEB 75

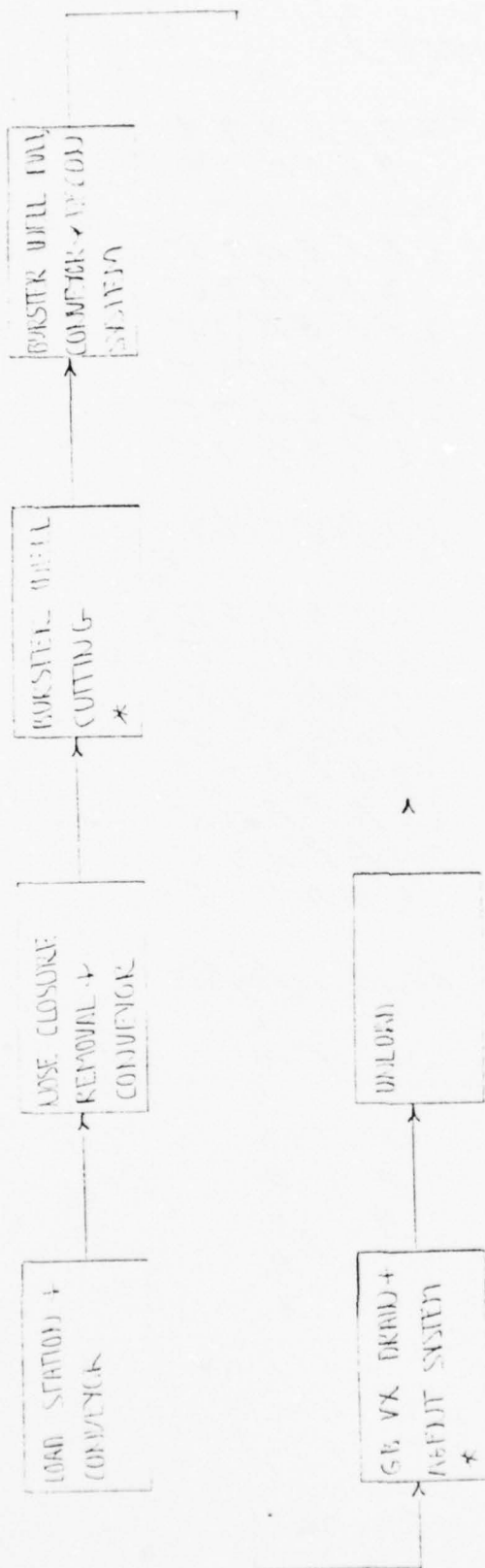
18-301-1/1	11 DEC 74
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18-534-01	2 MAY 75
02	2 MAY 75
03	1 MAY 75
04	1 MAY 75
05	28 APR 75
06	29 APR 75
07	30 APR 75
08	6 MAY 75

18-651-01	1/4	Rec'd 12/20/75
	2/4	" "
	3/4	" "
	4/4	" "
03	"	"
04	"	"
05	1/2	" "
	2/2	" "
10	"	"

# BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

## OPERATIONAL FLOW CHART



\* STATIONS AVAILABLE FOR AIRBORNE PROJECTILES

25 10/11/15

SHEET 1 OF 1

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK 118 PROJECTILE PULL AND DRAIN (PPD)

ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (N)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
						FAIL. CONSEQ. (N)	RATE (10 <sup>-6</sup> /HR)	SOURCE (N)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	
Cylinder, HVO Blue Bearings Cylinder, HVO Nipples, Ball Cutter, Cam Shaft Bearings, Ball Cam	Load Station Converter Converter Intermediate Motor Converter Tactile Converter Index	J610	0100	1	0100	2	15.225	p15	15.225		40	40.912	p15 Aer. Ins, HVO, GND
		PA3 224-9	0105	2	0105	2	9.4	p16	1.071		2.0	15.134	p16 Bearings, Ball, GND
		J36 19	0201	3	0201	2	15.225	p15	15.225		40	152.716	p15 Aer. Ins, HVO, GND
		2111507	0207	1	0207	2	2.746	p16	2.746		2.0	7.558	p16 Bearings, Ball, GND
		RT 30	0208	1	0208	2	15.225	p15	15.225		2.0	31.612	p15 Aer. Ins, HVO, GND
Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO	Converter Index	238420	0209	4	0209	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0212	2	0212	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0219	2	0219	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0223	1	0223	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0225	1	0225	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO	Converter Index	238420	0226	2	0226	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0227	2	0227	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0228	2	0228	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0229	2	0229	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0230	2	0230	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO	Converter Index	238420	0231	2	0231	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0232	2	0232	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0233	2	0233	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0234	2	0234	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0235	2	0235	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO Cylinder, HVO	Converter Index	238420	0236	2	0236	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0237	2	0237	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0238	2	0238	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0239	2	0239	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND
		238420	0240	2	0240	2	2.452	p16	2.452		2.0	19.648	p16 Aer. Ins, HVO, GND

$\Delta_{INA} = 27844 \times 10^{-6} / \text{HR}$   $\Delta_{INATM} = 848.44 \times 10^{-6}$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

Δ CYCLE ITEMS

MTBF =  $\frac{1}{\text{INA}}$  MTR =  $\frac{\text{INATM}}{\text{INA}}$  AVAILABILITY =  $\frac{1}{\text{MTR}} \times 100\%$

HRS

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				AND DRAIN (FPS)				
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda \times 10^{-6}/\text{HR}$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (X10 <sup>-6</sup> )	NATM	SOURCE (*)	REMARKS
CRANKER, MVD	Motor Converter Conversion Station			1		2	16.225	p15	15.225			40	40	60.912	p15	Motor, Low, Good, MID
BEARING, MVD	Motor Converter Conversion Station			4		2	2.057	p16	8.216			20	20	16.912	p16	Bearing, Good
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			40	40	20.912	p15	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	15.225	p15	15.225			40	40	60.912	p15	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	21.48	p15	21.48			40	40	60.912	p15	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			2		2	2.057	p16	4.118			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	16.225	p15	16.225			40	40	60.912	p15	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			2		2	15.225	p15	15.225			40	40	60.912	p15	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			3		3	7.552	p15	7.552			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station			1		2	11.04	p15	11.04			20	20	6.216	p16	Motor, Low, Good, MID
GEAR, MVD	Motor Converter Conversion Station															

•Information is detailed in Supplemental Data Sheet

Failure Sequence Code

1 - Catastrophic Failure

## 2 - Production Line Shutdown Failure

$$\Sigma \lambda = 7.552 \times 10^{-6} \text{ /HR } \checkmark$$

MTRR =  $\frac{\Sigma \text{NATH}}{\Sigma \text{NA}}$       ■      —      ■      —      HRS

$$\text{AVAILABILITY} = \frac{1}{\text{MTR}} \times 100\% = \underline{\hspace{2cm}}\%$$



DESCRIPTION			FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MEG. CODE NO.	QTY (H)	INFO. SOURCE (*)	FAIL. CONSD. (**)	PATE. A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)		REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10 <sup>-6</sup> )	N.A. TM
TRANSFORMER UNIT WITH ELECTRICAL, HYD SWITCHES	BOOSTER HEAT EXCHANGER SYSTEM	121 W161000	78137	1	2701	2	1.206	P 29	1.206			4.0	4.024	P 29	IN 12-3 HEAT EXCHANGER (AUG)
HEAD, LOW-ANAL CIRCUITS, HYD	CUT WELD	6	72117	1	2402	2	15.225	P 15	15.225			4.0	10.912	P 15	HEAD, LOW-ANAL HYD GND
BRKING, CRACKING, SWITCH	PISTON WIPING HEAD	28 W161000	05227	1	2403	2	15.225	P 15	15.225			2.6	5.292	P 15	SW, LOW, GND
SWITCH	GUIDE FOR AIRLINE ASSEMBLY	124 25-16	71041	4	2703	2	2.059	P 16	2.216			2.0	1.872	P 16	HEAD, LOW-ANAL GND
SWITCH	HYDRA TANK OPERATION			1	2704	2	15.225	P 15	15.225			4.0	10.912	P 15	HEAD, LOW-ANAL GND
SWITCH	CRACK EXHAUST			1	2705	2	1.131	P 17	1.131			2.6	2.946	P 17	SW, LOW GND
SWITCH	PISTON WIPING HEAD			3	2706	2	1.131	P 17	1.131			2.6	2.946	P 17	SW, LOW GND

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\*Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

2 - Production Line Shutdown Failure  
3 - Motor Failure - Penafit Drilling Maintenance Devoted



PROJECTILE PULL  
AND DRAIN (PPD)

BUILDING DATA

REMARKS

REMARKS

REMARKS

REMARKS

REMARKS

NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL	REMARKS
1	DRIVE PUMP & LET	HR.	1	10.27	10.27	DRIVE PUMP & LET
2	PUMP AIR OUTLET	HR.	1	12.01	12.01	PUMP AIR OUTLET
3	OPERATE VS	HR.	2	12.04	24.08	OPERATE VS
4	MANURE VS	HR.	2	11.33	22.66	MANURE VS
5	CHALLENGER UP	HR.	1	11.33	11.33	CHALLENGER UP
6	CHALLENGER DOWN	HR.	1	11.33	11.33	CHALLENGER DOWN
7	1/2" MEAN UP	HR.	1	11.33	11.33	1/2" MEAN UP
8	1/2" MEAN DOWN	HR.	1	11.33	11.33	1/2" MEAN DOWN
9	BURDER VIRE LOCATION	HR.	2	11.33	22.66	BURDER VIRE LOCATION
10	CHUTE LOCATION	HR.	1	11.33	11.33	CHUTE LOCATION

980.20 x 10<sup>6</sup>

212174 x 10<sup>6</sup>

ΔSWL = 7.85

ΔSWL = 20.421 x 10<sup>6</sup>

WATER

MRS

Information is subject to supplemental data sheet

1. 1/2" MEAN UP  
2. 1/2" MEAN DOWN  
3. BURDER VIRE LOCATION  
4. CHUTE LOCATION



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #18 PROJECTILE PULL AND DRAIN (PPD)

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA				REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFC. SOURCE (*)	FAIL CONCQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/HR$ )	SOURCE (*)	N A $\Delta$	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N A TM ( $\times 10^{-6}$ ) $\Delta$	SOURCE (*)			
WINCHESTER HYD	UNLOAD STATION	P 31-25-44	04321	2	1002	2	10.225	P 15	30.456				40	121.824	P 15	9/18/86 General		
SWITCH	OWN MOVING TANK			1		2	1.133	P 37	1.133				26	2.946	P 37	9/18/86 General		
POWER CELL	LEADS UNLOCKED			1		2	1.133	P 37	1.133				26	2.946	P 37	9/18/86 General		
SWITCH	PROJ. LINE REMOVED			1		2	1.133	P 37	1.133				26	2.946	P 37	9/18/86 General		
	FLATTEN RETURN																	

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$$\Delta N A = 33.855 \times 10^{-6} / HR \quad \Delta E I A T M = 120.461 \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure

$$MTBF = \frac{1}{\Delta N A} = \frac{1}{33.855 \times 10^{-6}} = 29538 \text{ HRS}$$

$$MTR = \frac{E I A T M}{\Delta N A} = \frac{120.461 \times 10^{-6}}{33.855 \times 10^{-6}} = 3.56 \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + MTR \times 100\%} = \frac{1}{1 + 3.56 \times 100\%} = 0.22\%$$



1/3

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✓ 545

2/3

CALCULATIONS - BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

ITEM	QTY	UNIT	PRICE	TOTAL	AMOUNT	DATE	REMARKS
18-1	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
18-2	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
18-4	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
18-6	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
TOTAL	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
18-5	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD
18-7	20	32.5	500.00	10000.00	10000.00	1/1/00	PPD

BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

3/3

Item	QTY	UNIT	PRICE	TOTAL	DATE	REMARKS
10-3	20	223.548	363.783	57.62	12/2/75	10-3
10-3	32.5	223.548	363.783	57.62	12/2/75	10-3
10-3	50	223.548	363.783	57.62	12/2/75	10-3
10-3	20	2308.204	3389.0707	9702.278	12/2/75	10-3
10-3	32.5	2308.204	3389.0707	9702.278	12/2/75	10-3
10-3	50	2308.204	3389.0707	9702.278	12/2/75	10-3
10-3	20	223.842	363.783	57.62	12/2/75	10-3
10-3	32.5	223.842	363.783	57.62	12/2/75	10-3
10-3	50	223.842	363.783	57.62	12/2/75	10-3
10-3	20	2624.740	3703.4300	5698.613	12/2/75	10-3
10-3	32.5	2624.740	3703.4300	5698.613	12/2/75	10-3
10-3	50	2624.740	3703.4300	5698.613	12/2/75	10-3

BUILDING BLOCK: #18 PROJECTILE PULL AND DRAIN MACHINE (PPD)

- A HOST FOR MAINTENANCE PURPOSES IS ASSUMED TO BE AVAILABLE AT THE PPD FOR THE MAINTENANCE TIMES SHOWN
- PRIME COMPONENTS ON THE DECON AND AIR SITE WERE LIMITED TO THOSE USED IN THE PRODUCTION PROCESS. DECON STATIONS AND THEIR COMPONENTS WERE NOT INCLUDED
- THE PPD IS ASSUMED TO BE FULLY UTILIZED (IE ONE PROJECTILE OR MORTAR PER POSITION) FOR THE PURPOSE OF THIS STUDY
- THE IMPACT WRENCH AND ASSOCIATED HARDWARE FOR REMOVAL OF THE NISE CLOSURES IS INCLUDED IN ALL SYSTEMS APPLICATIONS. EXTRACTION OF THESE COMPONENTS FOR SAFETY APPLICATIONS HAS A NEGLIGIBLE IMPACT IN THE RESULTING SYSTEM PERFORMANCE CALCULATIONS.

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #19 CENTRAL DECON SYSTEM (CDS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	250.7	3395.6	1162.2	4.55	.99
Rocket, 115mm, M55	VX	Comp B	M28	"	"	"	"	"
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	7	7	7	7	
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M5					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M5					

\*MUNITION DEMILITARIZATION PROCESS FLOW



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #19 CENTRAL DECON SYSTEM (CDS)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MQ-1	GB	None	None	25.7	5375.1	1169.2	4.55	.79
Tank, Spray, TMU-28/B	VX	None	None	"	"	"	"	"
Ton Container	GB	None	None	"	"	"	"	"
Tone Container	VX	None	None	"	"	"	"	"
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None					

SUPPLEMENTAL DATABUILDING BLOCK  
# 19 CENTRAL CON  
SYSTEM (CDS)  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

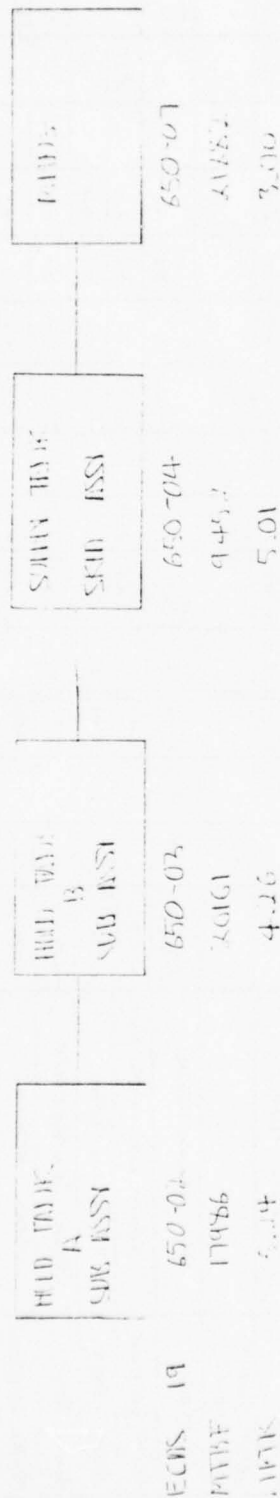
- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER RADC-TDR-640373 Vol II

2. NOTES Estimates were made where actual data not available

## D. GENERAL REMARKS

# BUILDING BLOCK: #19 CENTRAL DECON SYSTEM (CDS)

## FLOW CHART



BUILDING BLOCK #19

Block	Value 1	Value 2	Value 3
1	3295.6	112	112
2	4.55	112	112
3	1925	112	112

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

ITEM NO.		ITEM NAME		DESCRIPTION		FAILURE DATA				MAINTAINABILITY DATA / X				REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
						PART NO. 300-10		MFG CODE NO.		QTY (N)		INFO. SOURCE (•)		FAIL CONSEQ. (••)		RATE $\lambda$ $\times 10^{-6}/\text{HR}$		SOURCE $\lambda$ (•)		NA TH ( $\times 10^{-6}$ )		CHECK-TOTAL TIME (HR)		REPAIR TIME (HR)		DIAGN. TIME (HR)		REPAIR TIME (HR)		CHECK-TOTAL TIME (HR)		SOURCE (•)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
1.1	1	HEAD TANK A DRAIN ASSY		PUMP DECON SOLN		9477	1	2-02	2	17.054	P.30		0.5	3.5	1.0	5.0	P.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</

\*Information is detailed in Supplemental Data Sheet (if not on THIS SHF)  
 of 6-15-19-650-  
 b. See Bonds, features etc. and  
 present follow  
 \*\*Fol. - 4 Consequence Code

- 1 - astrophic Failure
- 2 - production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data sheet

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA / X					REMARKS
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6} \text{ HR}^{-1}$	SOURCE (*)	N1	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N1 M (X10 <sup>-6</sup> )	SOURCE (*)			
3.3	Swagelok Tank SP-10, 4555							0								C			
3.1	Pump, Centrif	Pump Decou	-	9277	1	A-04	2	13058	P18		0.5	3.5	1.0	5.0		P30	Very close, good.		
3.2	MOTOR	MOTOR FOR PUMP	-		1	A-04	2	41355	P21		0.5	2.0	0.5	3.0		P28	not near the tank		
3.3	ACTUATOR	SWR DECOU TANK 1/2 HP	-	80148	1	A-04	2	8158	P18		0.5	1	0.5	2		P28	not from the pump m.		
3.4	CAGE, PRESS	PUMP DISCHG PRESS.	-1199	-	1	A-04	2	1020	P25		0.5	1.0	0.5	2.0		P25	Sw. - A-04, 9277		
3.5	Valve Actuation	ON OFF DECOU SUPPLY	-1699	-	2	A-04	2	6.899	P4		0.5	2.5	1.0	4.0		P44	not on 9277		
3.6	Heater, Dry Feed	FEED DECOU PWD TO TANK	-1299	-	1	A-04	2	12499	CHC		0.5	3.0	1.0	4.5		EST	see calc.		
3.7	AC, TEMP	TANK TEMP	-1398	-	1	A-04	2	11405	P25		0.5	1.0	0.5	2.0		P25	200-45, 100-44		
3.8	HE, LEVEL	TANK LEVEL	-1597	-	1	A-04	2	11405	P25		0.5	1.0	0.5	2.0		P25	"		
3.9	Pressure, PH	PH IN TANK	-1498	-	1	A-04	2	11405	P25		0.5	1.0	0.5	2.0		P25	"		
3.10	Heater, Overhaul	TANK LEVEL, HIGH	-1299	-	1	A-04	2	11405	P25		0.5	1.0	0.5	2.0		P25	"		
3.11	Heater, Insulation	TANK HEATER	-0748	-	1	A-04	2	2.514	P24		0.5	3.2	0.5	4.4		P24	Heater on 9277 m.		
3.12	Tank	Swagelok TANK	-0501	-	1	A-04	2	3.001	P19		0.5	13.5	1.0	14.0		P34	200-45, 100-44 m.		
3.13	Valve, AUG	5/8 VALVE, HAND	See 2-07	9277	12	A-07	2	1489	P45		0.5	1.0	0.5	2.0		P45	200-45, 100-44 m.		
3.14	Expansion Joint	EXPANSION	See 2-07	9277	2	A-07	2	3	EST		0.5	1.0	0.5	2.0		EST	EST		

• Information is detailed in Supplemental Data Sheet

- 1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

ZNA = _____	$\times 10^{-6}$ /HR	INATM = _____	$\times 10^{-6}$
_____	_____	MTTR = _____	_____
_____	_____	INATM ZNA	_____
_____	_____	MTBF = _____	_____
AVAILABILITY = _____	$\frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$	_____	_____



10/10/75  
-2-75

SUMMARY - BUILDING BLOCK: #19 - CENTRAL DECON SYSTEM (CDS)

ITEM	END	ENTR	MAINT	END	MAINT
	X10 <sup>-6</sup>	X10 <sup>-6</sup>	FACTORS	X10 <sup>-6</sup>	FACTORS
1	55.6	193.8	1X	290.7	1.5X
2	49.6	140.8	1X	211.2	1.5X
3	105.8	353.3	1X	530.0	1.5X
4	45.7	91.5	1X	137.3	1.5X
Σ	256.7			1169.2	

$$MTBF = 3895.6$$

$$MTTR = 4.55$$

$$A = .9988$$

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #21 BULK ITEM FACILITY (BIF)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA TM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX								
Rocket, 115mm, M55	GB	Comp B	M28					
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6					

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #21 BULK ITEM FACILITY (BIF)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	462.9	2460.3	3979.2	8.60	.99
Tank, Spray, TMU-28/B	VX	None	None	587.4	1702.4	5644.2	9.61	.99
Ton Container	GB	None	None	486.6	2055.1	4562.8	9.38	.99
Tone Container	VX	None	None	"	"	"	"	"
MK 94 Bomb	GB	"	"	560.4	1784.4	5026.7	8.97	.99
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	—	—	—	—	—

SUPPLEMENTAL DATABUILDING BLOCK  
# 21 BULK ITEMS  
FACILITY (BIF)  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

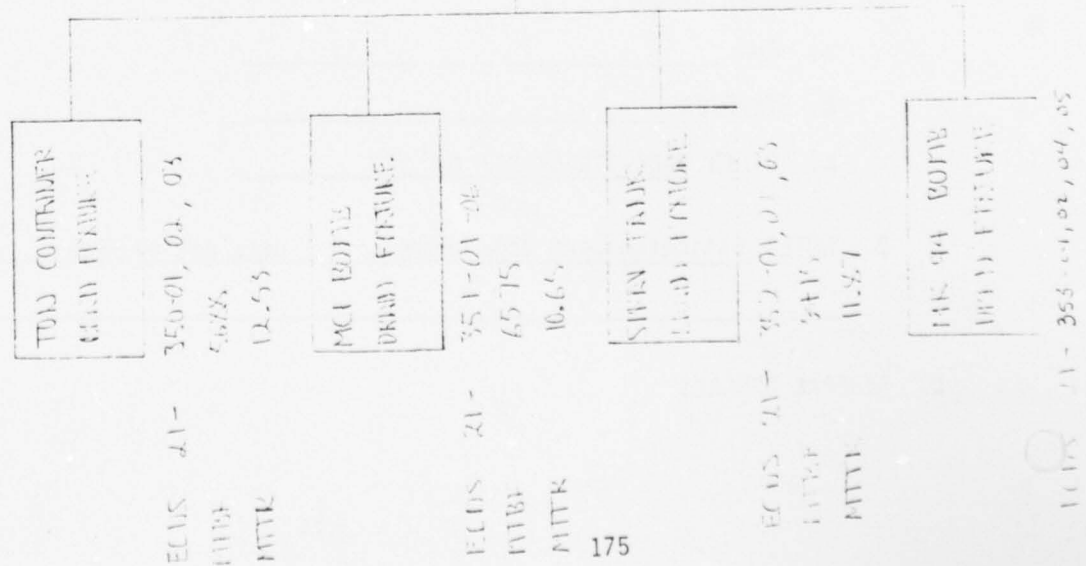
- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available

## D. GENERAL REMARKS

# BUILDING BLOCK: #21 BULK ITEM FACILITY (BIF)

## FLOW CHART





Revised 11/1/85

SHEET 1 OF 2

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

TOW CONTAINER DRAW FIXTURE ASSY

BUILDING BLOCK #21 BULK ITEM FACILITY

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
							FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> )	
11	Crane Mass	LOCAL REDUCTION OF PRESSURE - RESTORE PRESSURE TO 21.12	1000, 1001		2	0-01	2	1.020	P-15	1.5	3	1.5	5.5	P-15 2nd air system
12	Valve Assy	VALVE HYDRAULIC 1000 03	1299		3	"	2	6.834	P-14	1.5	7.5	3	11.5	P-14 valve out of order
13	Switch	Switch Assy 21.12	65716		3	"	2	1.133	P-17	1.5	4.8	1.5	7.8	P-17 Switch good
14	Junction Box	Hydraulic Junction Box 03	1000 03		1	"	2		P-18	1.5	1.5	1.5	4.5	P-18 N/A
15	Filter Box	Filter Outlet Box 03	6400174		1	"	2		P-15	1.5	1.5	1.5	4.5	P-15 Filter good
16	Cylinder	Hydraulic Cylinder Assy 01	0497		1	"	2	15.238	P-15	1.5	7.5	3	11.5	P-15 Cylinder good
17	Clear Box	3 Way Valve Box 01	5026532		2	0-07	2	11.716	P-17	1.5	13.5	3	18	P-17 Clear Box good
176	Motor	Hydraulic Motor 01	AA?	94151	1	"	2	22.440	P-19	7.5	9.0	1.5	12.0	P-19 Motor good
18	Load Cell Assy	Load Cell Assy 01	0498		4	"	2	16.153	P-10	1.5	9.0	1.5	12.0	P-10 Load Cell good
19	Locating Roller Assy	Locating Roller Assy 01	0499		1	"	3	(.230)		1.5	1.5	1.5	4.5	P-10 Locating Roller good
20	Roller Assy	Roller Assy 01	0495		2	"	2	.230	P-14	1.5	7.0	1.5	10.0	P-14 Roller good
21	Roller Assy	Roller Assy 01	0314		1	"	2	.730	P-14	1.5	7.0	1.5	10.0	P-14 Roller good
22	Motor Assy	Motor Assy 01	0310	94151	1	0-03	2	22.140	P-14	1.5	4.0	1.5	12.0	P-14 Motor good
23	Roller	Roller 01						1.000						P-14 Roller good

INA =  $\lambda \times 10^{-6}$  /HR  $\times 10^{-6}$  INATM =  $\lambda \times 10^{-6}$

\*Information is detailed in Supplemental Data Sheet

b. CANDO FAILURE RATE

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #21 BUILDING ITEM FACILITY																	
(BIF)																	
MAINTAINABILITY DATA 3 X																	
FAILURE DATA																	
DESCRIPTION																	
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSOLE (**)	RATE X10 <sup>-6</sup> /HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10 <sup>-6</sup> )	NXTH TIME (X10 <sup>-6</sup> )	SOURCE (*)	REMARKS
2.1	VALVE ASSY	HYD. VALVE - HYD FLUID TO ACTUATOR	-0403		1	4-01	2	6.834	P44		1.5	7.5	3	11.5		P44	Value and gnd H/L
2.2	SWITCH	PUSH SWITCHES ELEC	LSM-212 LSM-212	41415	5	"	2	1.133	P37		1.5	4.8	1.5	7.8		P37	See in hydro
2.3	HYD CYLINDER	MISC. ACTUATOR, ABOVE BOMB 2" HELD BOMB	LSM-212	60265	5	"	2	15.388	P15		1.5	7.5	3	11.5		P15	See in hydro
2.4	FUNCTION BOX	ELEC. FUNCTION	4100-308 P-0701	03089	2	"	2	.515	2441								See in hydro
2.5	DRILL MOTOR	DRIVE DRILL MP1	U-500K	24041	1	"	2	4.835	P29		1.5	6.0	1.5	9.0		P15	Value from 50 air/L
2.6	DRILL 4 WAY VALVE	AIR SUPPLY FOR DRILL	-2103		1	"	2	10.751	P45		1.5	3.0	1.5	6.0		P45	Value from 50 air/L
2.7	ROLLER	BOMB SUPPORT (IN DRILL ASSY)	-2103		1	"	2	.280	P4		1.5	2.0	1.5	10.0		EST	See in hydro
2.8	AIR FEED DRILL	DRILL BOMB			1	"	2	15.474	P4		1.5	6.0	1.5	9.0		P28	Value from 50 air/L
2.9	SUPPORT VALVE	ASSOC W. 2.1-2.6	MS228125	81915	2	"	2	1.276	P11		1.5	4.5	1.5	7.5		P42	Value from 50 air/L
2.10	WATER CELL ASSY	WT BOMB	-0501		1	"	2	16.153	P40		1.5	9.0	1.5	12.0		EST	Value from 50 air/L
2.11	ROLLER	SUPPORT BOMB	-2503		4	"	2	.280	P16		1.5	7.0	1.5	10		EST	Value from 50 air/L
2.12	DRIVE	ELECTRO DRIVE - STOP BOMB MOTION	ES-375	63810	1	"	2	11.976	P4		1.5	9	1.5	12.0		P18	Value from 50 air/L

158-175033 D

• Information is detailed in Supplemental Data Sheet

James Earl Ray  
ADAM WAL.

$$MTBF = \frac{1}{FMS}$$

HRS

WTTB IN 17M

WRS

\*\*Fall... Consequence Code

1 - strophic failure

2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period

A - Con. Circumferential Note Sheet

$$\text{AVAILABILITY} = \frac{1}{1 + \frac{\text{MTR}}{\text{MRE}}} \times 100\% = \frac{\text{MRE}}{\text{MRE} + \text{MTR}} \times 100\%$$

Revised 10/16/15

SHEET 3 OF 6

BUILDING BLOCK #21 BULK ITEM FACILITY (BIF)

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

SPRAY TANK DRAIN FIXTURE ASSY

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (N)	FAIL CONSEQ (N)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (N)	NA	MAINTAINABILITY DATA 3X					REMARKS
											DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NX TM $\times 10^{-6}$	
31	VALVE-SOLENOID	HYD FLUID SHUT OFF (S)	US3D8250	8117	2	4-01	2	1.276	P42		1.5	4.5	1.5	7.5		Valve fuel 3.1 hyd.
32	Function Box	ELEC-CONNECT-JUNCTION (S)	400 2.3 1-1701	03284	2	"	2	.575	P42							
33	SWITCH	MINIMUM (LIMIT) ROD (-150V) TRAVEL (S)	R306-2001	71424	2	"	2	1.133	P37		1.5	4.3	1.5	7.8		SW 50ms gnd
34	ACTUATION	MOVING 2501 ACTUATOR FOR VOICE & LOAD CELL (S)	2501	18740	4	"	2	15.235	P15		1.5	7.5	3.0	11.5		Act lin hyd gnd
35	LOAD CELL	WT TANK TYPE C301	206175	03084	4	"	2	16.153	N40		1.5	9.0	1.5	12.0		8000 gm air/h.s
36	GEAR BOX	5 WAY (S)	5K 2.03-B 1-1701	18740	2	"	2	11.726	P37		1.5	13.5	3	10		gear box end m
37	MOTOR, HYDRAULIC	ROTARY DRIVE (S)	AT ?	16151	1	"	2	12.14	P49		1.5	9	1.5	12		motor Hyd Dec 01/16.5
38	HYDRAULIC	ACTUATOR (S)	LSM3X50	40285	2	"	2	15.235	P15		1.5	7.5	3.0	11.5		act lin hyd gnd
39	"	" (S)	LSM3X50	40285	2	4-02	2	15.235	P15		1.5	7.5	3.0	11.5		"
40	HYDRAULIC	LIMIT SWITCH ON SPRING FIXTURE (S)	LSM3X50-30 1-1701	41924	3	"	2	11.33	P37		1.5	4.8	1.5	7.8		SW 50ms gnd
41	HYDRAULIC	ASSUM. W. DRILL UNIT (S)	40591-4	07990	1	4-03	2	1.443	P43		1.5	5.1	1.5	8.1		valve hyd ckn 01/16.5
42	DRILL	SELF FEED DRILL UNIT (S)	8165-6-1	03990	1	"	2	15.474	P38		1.5	6	1.5	9		SW 50ms gnd m 16
43	HYD CYLINDER	ASSUM. WITH MOUNT (S)	LSM3X50	40285	1	"	2	15.235	P15		1.5	7.5	3.0	11.5		act lin hyd gnd
44	VALVE	PILOT BLEEDER ASSUM. (S)	9600	03990	2	"	2	1.514	P41		1.5	3	1.5	6		valve failed gnd

INA =  $\frac{1}{MTBF} \times 10^{-6}/HR$  INATH =  $\frac{INATH}{TNA} \times 10^{-6}$

MTBF =  $\frac{1}{INA}$  MTR =  $\frac{INATH}{TNA}$  HRS

AVAILABILITY =  $\frac{1}{1 + MTR} \times 100\% = \frac{1}{1 + \frac{INATH}{TNA}} \times 100\%$

a. ECOS 21-356-  
b. See OPMOS Fail Rate & Minut Black Folder

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - Failure Consequence Code Sheet

Revised 11/1/85

SHEET 4 OF 6

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #21 BULK ITEM FACILITY (BIF)

HOIST MODULAR SYSTEM

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA				MAINTAINABILITY DATA 3X					REMARKS
							FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME TH ( $\times 10^{-6}$ )	SOURCE (*)	
40	HOIST CARRIER TRUCK	CONTAINER TRANSPORT	?	?	1	G-01	2	5.714	P-9	5.714	1.5	9	1.5	12	P-9	Motor 10 hp 4h
41	CARRIER DRIVE	Motor & Drive For 24-41			1	"	2	7.600	P-8	7.600	1.5	4.5	1.5	7.5	P-8	Motor 2 hp 4h 4h

4. E-COS 11-713 -  
5. CHARTS FAIL. RATE T-MANUAL, REF (3) CHART FORM  
\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - stoppage Failure
- 2 - reduction Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$\begin{aligned}
 \text{INA} &= \text{---} \times 10^{-6} / \text{HR} & \text{ENATM} &= \text{---} \times 10^{-6} \\
 \text{MTDF} &= \frac{1}{\text{INA}} & \text{MTR} &= \frac{\text{ENATM}}{\text{INA}} & \text{HRS} &= \text{---} \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTR}} \times 100\% = \text{---} \%
 \end{aligned}$$







REVISION 11/1/78  
SHEET 6 OF 6

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #21 BULK ITEM FACILITY (BIF)

BLK 944 Bomb Repair Fix Price

FAILURE DATA														MAINTAINABILITY DATA 3 X					REMARKS (Note: Blank 2 = None)
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	DATE X 10 <sup>-6</sup> HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N X TM (X 10 <sup>-6</sup> )	SOURCE (*)			
11	Flare, Assy	Fluid Transfer	112600	112600	4	Q-01	2	2.245	P15		1.5	3	1.5	6		P15			
12	Crumper, One	Misc Clamp & Bomb Bomb	LSM-500	60345	3	Q-01	2	15.235	P15		1.5	7.5	3	11.5		P15			
13	Switch	Light Switch-Bomb Bomb	LSM-500	99999	7	Q-01	2	1.114	P15		1.5	4.8	1.5	7.8		P15			
14	Understand Bomb	Elec. Count	110300	30303	2	Q-01	2	.191											
15	Actuator	Hyd Actuator - Bomb Bomb	-2097	-	1	Q-01	2	15.118	P15		1.5	7.5	3	11.5		P15			
16	Valve	SH Hyd Valves Hyd Bomb Bomb	-2788	-	7	Q-01	2	4.214	P44		1.5	7.5	30	12		P44			
17	Valve	Drill Bomb	-0599	-	1	Q-01	2	SE	P15	1.5	2.3	7.5	2.7						
18	Valve	Bomb Bomb	-2503	-	4	Q-02	2	0.285	P15		1.5	7	1.5	10		P15			
19	Bomb	Elec. Bomb - Bomb Bomb	EB-315	63810	1	Q-02	2	11.472	P15		1.5	9	1.5	12		P15			
20	Load Cell	Bomb Weight	-0799	-	1	Q-02	2	16.153	P46		1.5	9.0	1.5	12		P46			
21	Valve	Fluid Air Bleed	V-5002	P1071	1	Q-04	2	10.787	P45		1.5	3	1.5	6		P45			
22	Valve	Submerged Valve	USDB0115	81115	2	Q-04	2	1.276	P46		1.5	4.5	1.5	7.5		P46			
23	Hyd Switch	Act. Cylinder	110300	30303	4	Q-05	2	15.118	P15		1.5	7.5	3	11.5		P15			
24	Switch	Light Switch	LSB-316	99999	1	Q-05	2	1.113	P15		1.5	4.8	1.5	7.8		P15			
25	Drill	Drill Bomb (Bomb Bomb)	-1203	-	1	Q-05	2	15	P15		1.5	3	1.5	6		P15			
26	Actuator	Hyd Actuator	-2805	-	1	Q-05	2	15.118	P15		1.5	7.5	3	11.5		P15			
27	Flare Bomb	Flare Bomb	110300	30303	1	Q-05	2	5.016	P15		1.5	6.0	1.5	9		P15			

Q. EDCB 21-352 - 1. 11/1/78 2. 11/1/78 3. 11/1/78 4. 11/1/78 5. 11/1/78 6. 11/1/78 7. 11/1/78 8. 11/1/78 9. 11/1/78 10. 11/1/78 11. 11/1/78 12. 11/1/78 13. 11/1/78 14. 11/1/78 15. 11/1/78 16. 11/1/78 17. 11/1/78 18. 11/1/78 19. 11/1/78 20. 11/1/78 21. 11/1/78 22. 11/1/78 23. 11/1/78 24. 11/1/78 25. 11/1/78 26. 11/1/78 27. 11/1/78

INA =  $\frac{1}{MTBF} \times 10^6$  / HR INATM =  $\frac{ENATM}{INA} \times 10^6$

MTBF =  $\frac{1}{MTBF} \times 1000$  =  $\frac{1}{MTBF} \times 1000$

AVAILABILITY =  $\frac{1}{1 + MTBF} \times 1000$  =  $\frac{1}{1 + MTBF} \times 1000$

Information is detailed in Supplemental Data Sheet

Fast-time Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Repair During Maintenance Period  
4 - See Supplemental Data Sheet

(O. 2-75)

[illegible]

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	4601.7576	217.31	53437.995	11.61	94.1
Rocket, 115mm, M55	VX	Comp B	M28	4601.7576	217.31	53437.995	11.61	94.1
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	1920.0517	520.82	17048.665	8.88	98.1
Projectile, 155mm, M121A1	GB	None	None	1386.5888	721.19	11925.633	8.60	98.1
Projectile, 155mm, M121	GB	None	None	1386.5888	721.19	11925.633	8.60	98.1
Projectile, 155mm, M122	GB	None	None	1386.5888	721.19	11925.633	8.60	98.1
Projectile, 8", M426	GB	None	None	1005.544	994.49	8266.3235	8.22	99.1
Projectile, 155mm, M121A1	VX	None	None	1386.5888	721.19	11925.633	8.60	98.1
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	5426.815	184.27	43942.101	8.10	95.1
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	3688.244	271.13	30547.389	8.28	97.1
Projectile, 155mm, M104	HD	Tetrytol	None	3688.244	271.13	30547.389	8.28	97.1
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	59.5858	16782.522	361.1348	6.06	99.1
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	3303.338	302.72	33099.942	10.02	96.1
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	3303.338		33099.942		96.1

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

2

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

MUNITION	AGENT	EXP.	PROP.	N <sub>A</sub>	MTBF	N <sub>ATM</sub>	MTTR	AVAIL PBL
*BULK ITEMS, GB/VX								
Bomb, 750#, MQ-1	GB	None	None	NA	NA	NA	NA	NA
Tank, Spray, TNU-28/B	VX	None	None	NA	NA	NA	NA	NA
Ton Container	GB	None	None	NA	NA	NA	NA	NA
Tone Container	VX	None	None	NA	NA	NA	NA	NA
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	NA

SUPPLEMENTAL DATA

BUILDING BLOCK

#22 MATERIAL

HANDLING EQUIPMENT

(MHE)

## A. DESCRIPTION

## 1. SOURCE

a. DRAWING NO. SEE ATTACHED DATE: \_\_\_\_\_

b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_

c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_

b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_

b. TEAD/EA \_\_\_\_\_

c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

## D. GENERAL REMARKS

SEE NOTES ON ATTACHED SHEETS



BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE) 2/9  
 2/12/75 ieu

# *Drawings:*

22-400-01	13 MAR 75		
-02	28 MAR 75		
03	21 APR 75		
04	22 APR 75		
05	22 APR 75		
06	24 APR 75		
07	10 MAR 75		
08	11 MAR 75		
22-401-01	3 MAR 75		
02	28 APR 75		
03	4 MAR 75		
04	29 APR 75		
05	30 APR 75		
06	25 MAY 75		
07	31 MAY 75		
08	1 JUN 75		
09	6 JUN 75		
10	24 JUN 75		
11	8 JUL 75		
22-402-01	23 SEP 74	REV	1
22-402-02	12 MAR 75	REV	2
05	2 MAR 75	REV	1
07	2 MAR 75	REV	1
08	12 MAR 75	REV	3
09	11 MAR 75	REV	1
22-403-14	8 JUN 75		
20/20	24 AUG 71		
22	1 MAR 74		
23	5 MAR 74		
22-404-02	11 OCT 74		
03	17 OCT 74		
04	0 OCT 22 74		
05	24 OCT 74		
06	24 OCT 74		
07	12 SEP 74		

3/9  
12/12/75

## DRAWINGS (CONTINUED):

22-404-08	10 DEC 74	
09	11 DEC 74	
10	12 DEC 74	
11	DATE OFF SHEET	
12	17 DEC 74	
13	19 DEC 74	
14	23 DEC 74	
15	17 JAN 75	
16	20 JAN 75	
17	27 JAN 75	
18	4 FEB 75	
22-410-01	25 OCT 74	REV 1
05	21 NOV 74	REV 1
22-411-1/2	18 JUL 74	REV 2
- 3/4	26 JUL 74	REV 1
22-412-01	9 NOV 74	REV 2
02	11/19/74	REV 3
06	19 NOV 74	REV 2
07	19 NOV 74	REV 2
08	11/20/74	REV 2
09	9 NOV 74	
22-414-01	20 FEB 75	REV 1
03	18 FEB 75	REV 1
05	31 MAR 75	
07	21 MAR 75	
22-415-07	27 DEC 75	
22-418-1/1	11 MAY 74	REV 1
- 7/8	28 JAN 74	
- 9/8	1 FEB 74	

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

4/9  
12/12/75 LWC

*DRAWINGS (CONTINUOUS):*

22-419-02	12 JUN 74	REV	1
04	5 JUL 74	REV	2
05	31 JAN 73		
06	18 JUL 74	REV	2
22-420-01	30 JAN 75	REV	3
22-421-01	30 JAN 75	REV	2
02	30 JAN 75	REV	2
03	9 JAN 75	REV	1
05	30 DEC 74		
22-304-09	30 CT 73		

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

*Drawings (Continued):* SEATECH ENGINEERING, INC  
JOB NO. 75-340 AUTOMATED CONVEYOR SYSTEM

5/9

12/12/75

DRAWING

<u>NO.</u>	<u>DATE</u>	<u>TITLE</u>
L1	7-22-75	CONVEYOR PATH
L2	7-28-75	CONVEYOR SECTION A-A
L3	7-29-75	CONVEYOR SECTION E-E
L4	7-29-75	CONVEYOR SECTION B-B, D-D, CC'
L5	8-1-75	LIFT TABLE (MPL)
→ L6	8-13-75	TRANSFER DEVICE (MPL)
L7	8-14-75	LIFT TABLE (PDR)
→ L8	10-13-75	TRANSFER DEVICE (PDR)
L9	10-13-75	TRANSFER DEVICE (PDR)

LETTER SEATECH ENGINEERING INC TO SURFACE  
COMBUSTION DIVISION, MIDLAND ROSS CORP  
REFER JIR PX-1295, AUGUST 28, 1975

AD-A062 401

TRW/ENVIRONMENTAL ENGINEERING DIV REDONDO BEACH CA

F/G 14/4

RELIABILITY AND MAINTENANCE PROGRAM ANALYSIS RELIABILITY AND MA--ETC(U)

APR 76

DAA649-75-C-0135

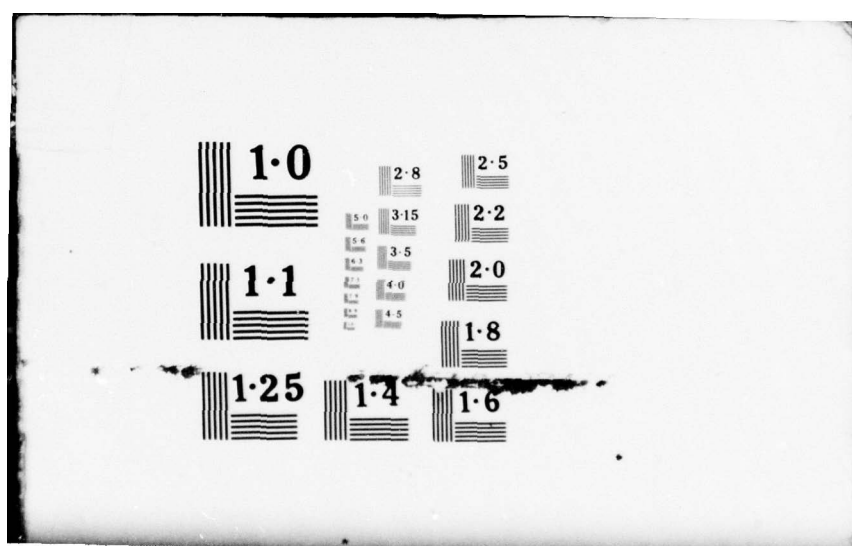
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3 OF 4  
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6/3  
12/14/51GENERAL

- THE FOLLOWING CONVEYORS ARE ANALYSED AS CONTINUOUS OPERATING EQUIPMENT:

DEHC FURNACE INPUT

PDF INPUT (EXCEPT FOR ACCUMULATOR

PDF OUTPUT (PORTIONS ONLY)

- BEARINGS USED IN THE MHE ARE ASSIGNED AS CATEGORY 2 FAILURE CONSEQ. AND GIVEN FAILURE RATES FROM RADC-TIR-69-458. THIS APPROACH IS ULTRA CONSERVATIVE SINCE FAILURE OF A SINGLE BEARING IN A STUCK/BINDING MODE WILL NOT PREVENT THE MUNITION FROM MOVING TO THE NEXT ROLLER. IF IT SHOULD, THE NEXT MUNITION WILL PUSH THE STOPPED ITEM CLEAR AND PRODUCTION WILL NOT BE HALTED. A CHANGE TO CATEGORY 3 IGNORES THE IMPACT OF SELECTED BEARINGS HAVING A CATEGORY 2 IMPACT. A CONSERVATIVE ESTIMATE OF 1/10 OF THE BEARINGS MAY BE OF THE CATEGORY 2 IMPACT. AN ADJUSTMENT BY A 90% REDUCTION ALL BEARINGS INVOLVED WAS MADE DURING THE CALCULATION OF NR AND NRTM. ITEMS AND CALCULATIONS INVOLVED ARE INDICATED "0". THIS RESULTS IN A CONSERVATIVE APPLICATION OF DATA WITHOUT TIME CONSUMING ANALYSIS OF EACH BEARING APPLICATION.
- ALL EQUIPMENT IS ASSUMED TO BE CONTAMINATED BY AGENT FOR ASSIGNMENT OF CLOTHING FACTORIES

on sheet 7/15  
 a 90% reduction was  
 indicated 3/10 of bearing

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

7,  
12/1/51

THE MATERIAL HANDLING EQUIPMENT INCLUDED IN THIS ANALYSIS IS LIMITED TO THOSE IDENTIFIED IN THE LST "BB#22 MHE CONVEYOR APPLICATIONS". OTHER CONVEYORS ARE PART OF EQUIPMENT BUILDING BLOCKS. EXAMPLES:

INTERNAL CONVEYORS IN BB#5 MPF #6 RDM,  
#15 PDM, #18 PPD, #24 MDR

INPUT AND/OR OUTPUT CONVEYORS FOR BB#4 DFS,  
#5 MPF, #25 MIN

TITLES FOR CONVEYORS SHOWN ON FLOW CHARTS WERE OBTAINED FROM AN OUTLINE LIST OBTAINED FROM TOSER. TITLES SHOWN ON THE LST "BB#22 MHE CONVEYOR APPLICATIONS" AND ON THE "EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA" SHEETS WERE OBTAINED FROM THE DRAWINGS LISTED IN THE ENCLOSED SHEETS.

DATA FOR THE 4.2" MORTAR PROCESS ARE BASED ON USE OF CONVEYORS SIMILAR TO OR ARE THE FOLLOWING:

INPUT CONVEYOR PROTECTILE  
PSM INPUT  
PROTECTILE BURSTER OUTPUT  
EC PROTECTILE DISCHARGE  
HE DISCHARGE & SEGREGATING

EQUIPMENT FOR THE PDF ACCUMULATOR IS INCLUDED IN THE PDF INPUT CONVEYOR.

8/9  
12/12/75 LItem 22-3 PDF Out-put Conveyor

- Rollers - Estimated: 80 FT TOTAL LENGTH  
1 Roller / 6" = 160 Rollers  
2 Bearings / Roller

$$FR = \text{BEARING GENERAL GROUND} \text{ p 16 } 2.059 \text{ ea} \\ 4.118 / \text{Roller}$$

$$TM = \text{BEARING GENERAL GROUND} \text{ p 16 } 2 \text{ HRS}$$

$$\text{Split 234 Item Nos} = 160/5 = 32 \text{ Rollers / Item}$$

- ONE SET OF MOTOR/DRIVE CHAIN/ROLLERS AND ALL CYLINDERS ASSUMED TO BE CYCICAL IN APPLICATION WITH RATE EQUAL TO MUNITIONS PRODUCTION RATE (i.e. REMOVAL OF PROJECTILE/PARTISIDGE FROM PPD AND PLACING IT IN CONVEYOR TO MIPE).

Item 22-4 DEAC FURNACE INPUT CONVEYOR

$$\text{CONVEYOR LENGTH } 4\frac{1}{2} + 11\frac{1}{2} + 4\frac{1}{2} = 25\frac{1}{2} \text{ FT}$$

Assume SHAF Rollers on 6" centers -

$$\text{TOTAL BEARINGS} = 2 / \text{Roller} \times 2 \times 25\frac{1}{2} \times 2 (\text{HAND TRIP}) \\ = 204 \text{ ea}$$

$$FR = 2.059 \text{ p 16 BEARING GEN GRN}$$

$$\text{TOTAL RATE} = 528.36$$

9/9  
12/14/75

BUILDING BLOCK: #22 MATERIAL HANDLING EQUIPMENT (MHE)

RATIO MOTOR

FRACTIONAL HP AC, GND MOUNT	7.552	10 20
MECH, POWER TRANSMITTER, GEAR BOX	8.799	10 27
	<u>16.351</u>	

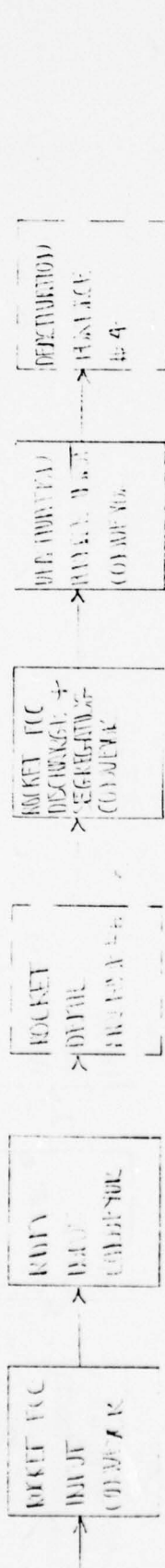
TURN TABLE ROLLER CONVEYOR

BEARINGS, CONICAL GND - Assume 100	20.59	10 16
TOTAL	20.59	

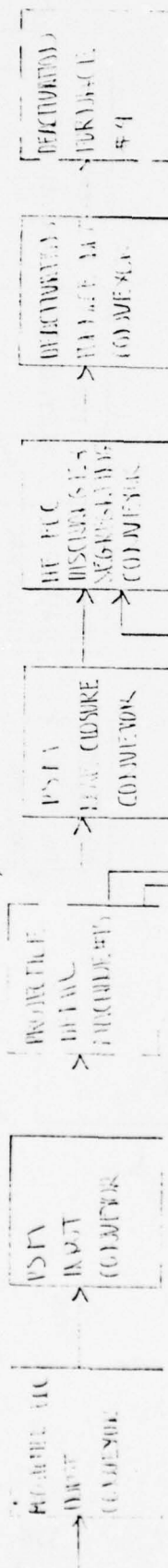


# BUILDING BLOCK: #22 \*MATER L HANDLING EQUIPMENT (MHE) FLOW CHART\*

## MATER ROCKET

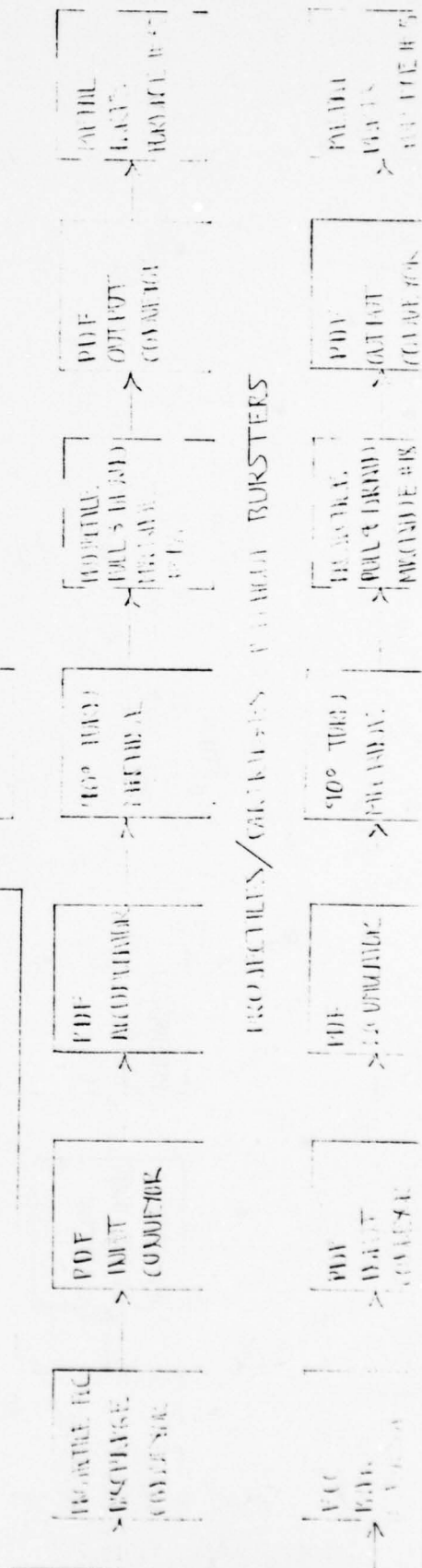


## PROJECTILES / CRANES WITH MASTERS

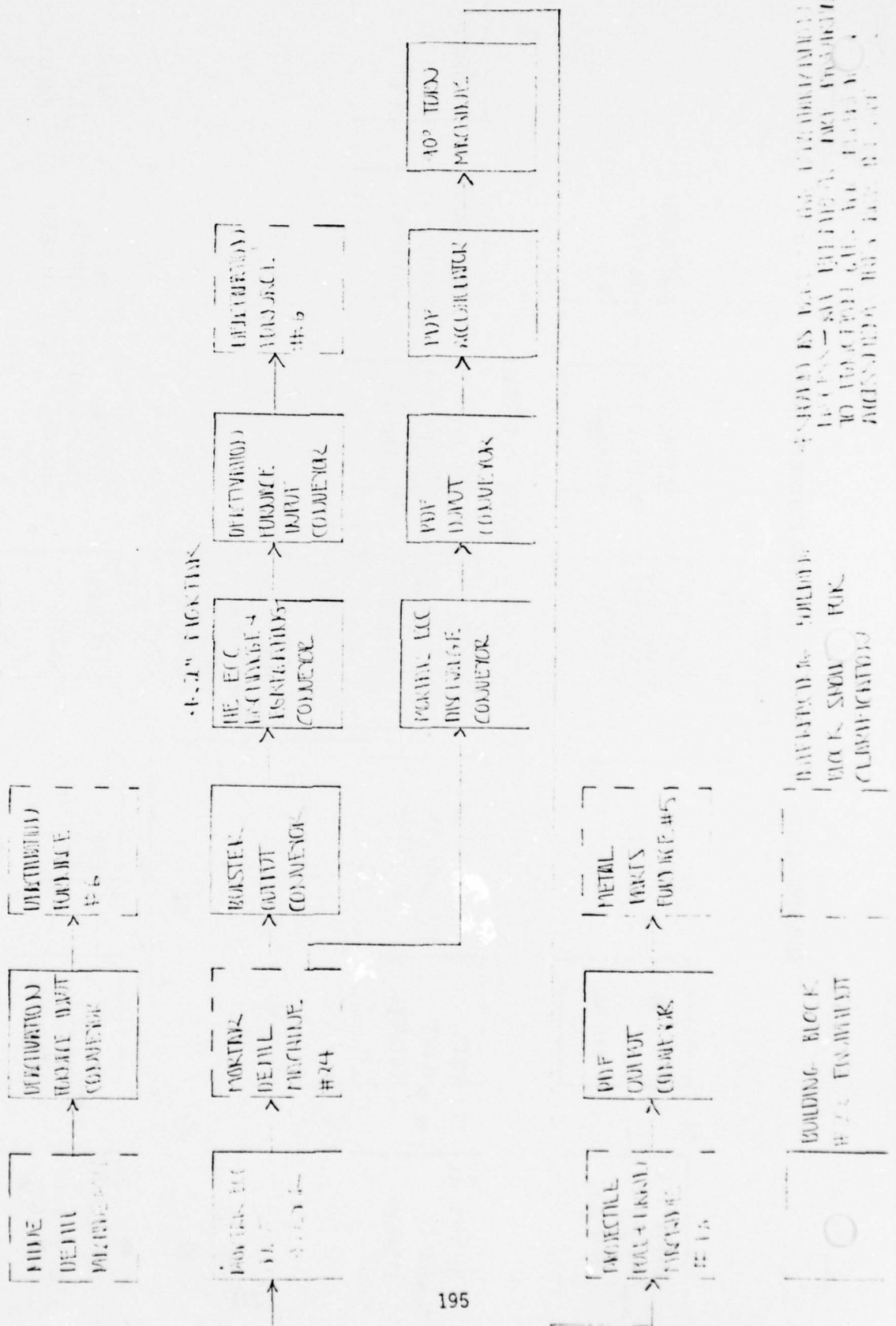


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## PROJECTILES / CRANES WITH BURSTERS



# PA 1.5. FLOWCHART



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK EQUIPMENT (MIE)																
DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N.A. TM (X10 <sup>-6</sup> )	SOURCE (*)	
1. CONVEYER, CHUTE	ROCKET ECC INPUT CONVEYER	5100-150	20815	1	1001	2	12.842	p15	2.284	.5	2.5	1.0	3.0	11.56	p15	Low life X life expectancy item
2. ROLLER, DRIVE	ROCKET CONVEYER	401832	71041	1	0102	2	16.351	A	16.351	.5	1.0	.5	2.0	2.702	p15	Front HPAC End
3. SPACER, CHAIN	ROCKET CHAIN	401832	71041	1	0103	2	Neg	Neg								
4. ROLLER, CHAIN	ROCKET CHAIN	401832	71041	3	0104	2	Neg	Neg								
5. CHUTE	ROCKET CHUTE	401832	71041	4	0105	2	Neg	Neg								
6. BEARING, CHUTE	ROCKET CHUTE	401832	71041	30	0106	2	2.280	p16	2.4	.5	1.0	.5	2.0	16.8	Est	Roller End
7. WHEEL, CHUTE	ROCKET CHUTE	401832	71041	2	0201	2	8.416	p16	8.932				3.0	50.976	p16	Hyd, Drive Rtg
8. SPACER, CHUTE	ROCKET CHUTE	401832	71041	17	0202	2	Neg	Neg								
9. ROLLER, CHUTE	ROCKET CHUTE	401832	71041	10	06012	3										
10. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	20	2005	2	2.059	p16	4.18				2.0	8.23	p16	Bearing End End
11. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1		2	1.133	p37	1.133				2.6	2.943	p37	Spindle End
12. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1		2	1.133	p37	1.133				2.6	2.943	p37	Spindle End
13. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1		2	16.351	A	16.351	.5	1.0	.5	2.0	2.702	p28	Front HP, End 172.6 in
14. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1	0101	2	Neg	Neg								
15. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	2	0103	2	Neg	Neg								
16. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	2	0104	2	15.223	p15	2.452	.5	2.5	.5	4.0	121.824	p15	Roller, End, Hyd
17. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	6	0114	3	2.059	p16	4.18	.5	2.5	.5	2.0	24.708	p16	Spindle End
18. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1	0117	2	15.222	p16	15.222	.5	2.5	.5	4.0	60.712	p16	Roller, End, Hyd
19. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1	0201	3	Neg	Neg								
20. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	1	0201	2	Neg	Neg								
21. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	11	0202	3	Neg	Neg								
22. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	22	0202	2	Neg	Neg								
23. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	2	0403	2	2.059	p16	4.18	.5	1.0	.5	2.0	8.23	p16	End End
24. CHUTE, CHUTE	ROCKET CHUTE	401832	71041	2	0405	2	2.059	p16	4.18	.5	1.0	.5	2.0	8.23	p16	End End

$\Delta N.A. = 170.4 \times 10^{-6} / \text{HR}$   
 $\Delta N.A. = 70.17 \times 10^{-6}$   
 $\Delta N.A. = 530.234 \times 10^{-6}$   
 $\Delta N.A. = 170.34 \times 10^{-6}$

MTBF =  $\frac{1}{\text{ENR}}$  HRS  
 MTR =  $\frac{\text{ENR}}{\text{ENR}}$  HRS  
 HRS

AVAILABILITY =  $\frac{1}{\text{MTR}} \times 100\% = \frac{1}{\text{MTR}} \times 100\%$

\* Information is detailed in Supplemental Data Sheet  
 \*\* Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK EQUIPMENT (MIE)

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT TIME TH (X10 <sup>-6</sup> )	N A TH (X10 <sup>-6</sup> )	SOURCE (*)
Base, Handwritten	ADMM Inverter Converter (Continued)	311-100-0867	5-4400	2	0914	2	1.140	0.4	0.45	.5	1.0	.5	2.0	2.0	p 24	4000 Gnd 1000
Switch L3 3.5	Handwritten, Item in Insulation, (in Hand)			3	0914	2	1.133	0.4	0.45	.5	1.0	.5	2.0	2.0	p 37	5000 Gnd
CRUMBER H40	Handwritten Discharge Resistance			1	0101	2	15.223	0.4	0.45	.5	2.5	.5	4.0	4.0	p 15	10000 Gnd, H40, Gnd
CRUMBER AIR		26451		7	0102	2	12.404	0.4	0.45	.5	2.5	.5	4.0	4.0	p 15	10000 Gnd, H40, Gnd
LIMIT SWITCH		05283		7	0102	2	1.133	0.4	0.45	.5	2.5	.5	4.0	4.0	p 15	10000 Gnd, H40, Gnd
BEARING CAM FOLLOWER		05157A		20	0103	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
WHEEL		115		30	0104	2	1.133	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT		71041		25	0105	2	2.059	0.4	0.45	.5	1.0	.5	2.0	2.0	p 15	10000 Gnd, H40, Gnd
BEARING THROAT																

Information is detailed in Supplemental Data Sheet

sequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

$$\text{AVAILABILITY} = \frac{1}{\text{DAYS}} \times 100\% = \underline{\hspace{2cm}} \%$$







EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK - #22 MATERIAL HANDLING EQUIPMENT (MHE)																	
DESCRIPTION				FAILURE DATA					MAINTAINABILITY DATA								
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ $\times 10^{-6}$ /HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N.A.T.M. (X10 <sup>-6</sup> )	SOURCE (*)	REMARKS	
Assembly, Bottom Drive	DEAC FURNACE INPUT	US 241	25319	1	(411)	2	5.2634	A	5.2634	.5	1.0	.5	2.0	10.1272	635	Gen Grnd 2HP AC Grnd	
Bearings, Fan Drive		LT 1000	7922	2	0109	2	2.234	1216	4.118	.5	1.5	.5	2.0	6.236	1216		
Motor, 1412				1	01	2	2493	1223	2.413	.5	1.5	.5	2.5	4.0322	1223		
Spreader, Top Drive																	Transducer Malfunction
Chain					1	01	2	114			.5	1.0	.5	2.0	7.05	140	
Motion Sensor					1	-	2	3.925	140	1.945							

199

INATM = 1072.825 X 10<sup>-6</sup>  
ENATM = 1072.825 X 10<sup>-6</sup>

ENATM = 1072.825 X 10<sup>-6</sup>  
ENATM = 1072.825 X 10<sup>-6</sup>

MTDF = 1 / ENA  
MTTR = 1 / ENA

\*Information is detailed in Supplemental Data Sheet  
\*\*Failure sequence Code  
1 - Catastrophic Failure  
2 - Production Line Shutdown Failure  
3 - Minor Failure - Does Not Affect Production

AVAILABILITY = 1 - MTTR X 100%  
1 - MTTR X 100% = 100%

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK

DESCRIPTION					FAILURE DATA					MAINTAINABILITY DATA					REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA $\Delta$	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> ) $\Delta$	SOURCE (*)	
ECC BYPASS Fuel Recirc Pump BEARING Holt Jolent Holt Jolent Holt Jolent BEARING Holt Jolent Holt Jolent Motion Sensor	ECC BYPASS	20706 CT34-3	15310	1	0101	2	N/A	p16	1.055	.5	1.0	.5	2.0	p16	STOP TO LMD
			1	0101	2	2.039	p16								Gen Good
			1	0101	2	N/A	p16	3.049	.5	1.0	.5	2.0	p16	Gen Good Bearings	
			80	0102	2	2.039	p16								Gen Good
			4	0107	2	N/A	p16	2.210	.5	1.0	.5	2.0	p16	Fact HP AC Gen Mdb	
			4	0107	2	2.039	p16								
			1	0110	2	2.039	p16								
			12	0201	2	N/A	p40	3.315	.5	1.0	.5	2.0	p40	Transducer, Pressure End	
			1	0307	2	3.925	p40								
			1	0307	2	3.925	p40								

200

$$\Delta \lambda_{NA} = 351.21 \times 10^{-6} / \text{HR}$$

$$\Delta \lambda_{NA} = 351.21 \times 10^{-6} / \text{HR}$$

$$\Delta \lambda_{NA} = 351.21 \times 10^{-6} / \text{HR}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

$$MTBF = \frac{1}{\lambda_{NA}} = \frac{1}{351.21 \times 10^{-6}} = 2847.1 \text{ HRS}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTR} \times 100\% = \frac{2847.1}{2847.1 + 1.0} \times 100\% = 99.96\%$$

DESCRIPTION			FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MFG NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)		REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME (X10-6) (HR)	SOURCE (*)
PDF INPUT & Accumulator					(4/0)										
Exp. Pressure Sensor		C234-B	15310	1	0111	2	2.05/100	1/6	4110	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		404	15310	104	0111	2	2.05/100	1/6	4110	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		C236-424	15310	6	0111	2	2.05/100	1/6	4110	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		1401-14	22000	1	0501	2	N/A	N/A	N/A	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		C211-B	15310	1	0502	2	16.351	1/6	16.351	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		M100	15310	2	0503	2	3.925	1/6	3.925	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor			15310	2	0504	2	1.131	1/6	1.131	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor			15310	1	0505	2	7.552	1/6	7.552	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor			15310	1	0506	2	15.223	1/6	15.223	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		C 90	2508	1	0701	2	20.27	1/6	20.27	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		402	0103	6	0702	2	2.05/100	1/6	2.05/100	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		403	71041	1	0703	2	16.351	1/6	16.351	.5	1.0	.5	2.0	2.230	Exp. Sensor
Pressure Sensor		404	07810	1	0704	2	5.251	1/6	5.251	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		405	71041	1	0705	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		406	71041	2	0706	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		407	71041	2	0707	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		408	71041	2	0708	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		409	71041	2	0709	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		410	71041	2	0710	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		411	71041	2	0711	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		412	71041	2	0712	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		413	71041	2	0713	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		414	71041	2	0714	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		415	71041	2	0715	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		416	71041	2	0716	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		417	71041	2	0717	2	N/A	N/A	N/A	.5	2.0	.5	3.0	6.177	Exp. Sensor
Pressure Sensor		418	71041	2	0718	2	N								

[illegible]

•Information is detailed in Supplemental Data Sheet

Sequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

Z - Production Line Shutdown Failure  
3 - Machine Failure - Don't Fix During Maintenance - Rejected





SHEET 8 OF 15  
#22 MATERIAL HANDLING  
EQUIPMENT (MHE)

BUILDING BLOCK

LOCATION	DESCRIPTION	PART NO.	QTY	UNIT	SPECIFICATION DATA				SOURCE	REMARKS
					ITEM NO.	ITEM NAME	ITEM QTY	ITEM UNIT		
5. Precinct Area	Sub Area	SAS 5005	1	LB	75-190	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
6. Sub Area	Sub Area	CMH 3203-12	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
7. Precinct Area	Sub Area	DT 333A1	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
8. Sub Area	Sub Area	FC 3167	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
9. Sub Area	Sub Area	FC 3173	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
10. Sub Area	Sub Area	CL 3 574	4	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
11. Sub Area	Sub Area	MT 100 270	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
12. Sub Area	Sub Area	DT 333A1	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND
13. Sub Area	Sub Area	1310AT	1	LB	2	NEG	2	NEG	4.0 6.912	Art, Lin, HVO, GND

$\Delta SNL = 95.284 \times 10^{-6}$   
 $\Delta SNL = 2.413 \times 10^{-6}$   
 $\Delta SNL = 2.413 \times 10^{-6}$   
 $\Delta SNL = 2.413 \times 10^{-6}$

Supplemental Data Sheet

Supplemental Data Sheet

Supplemental Data Sheet



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK				FAILURE DATA										MAINTAINABILITY DATA					REMARKS	
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE X10 <sup>-6</sup> /HR	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	NA TM (X10 <sup>-6</sup> )	SOURCE (*)					
Mining 1 Unit DC Drive, Base, Etc Controller	PDF Output Converter (cont)	1810-AT		1	Letter	2	2.413	P23 2112		.5	1.5	.5	2.5	6.0725	P23	24 PAC Gnd				
Architectural Potentiometer		1803-340	IR	1	Letter	2	3.239	P27 3.239		.5	2.0	.5	3.0	3.239	P27	24 PAC Gnd				
Smart Encoder		9042	Recon	1	Letter	2	1.012	P33 1.012		.5	1.0	.5	2.0	2.012	P33	24 PAC Gnd				
Tag Encoder		702	Recon	2	Letter	2	NEG	P24 35.889		.5	1.0	.5	2.0	71.712	P24	24 PAC Gnd				
Spacer Unit Switch		CPM101	Recon	1	Letter	2	212.21	Est 212.21		.5	1.0	.5	2.0	424.42	Est	24 PAC Gnd				
				2	Letter	2	1.133	P33 1.133					2.6	21.808	P33	24 PAC Gnd				
				21	Letter	2														

204

Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period

MTBF =  $\frac{1}{\text{MTR}} \times 100\%$  =  $\frac{1}{1 + \text{MTR}}$   
 MTR =  $\frac{1}{\text{MTR}} \times 100\%$  =  $\frac{1}{1 + \text{MTR}}$   
 INATM = 504.285, 10-6  
 INATM = 504.285, 10-6  
 INATM = 504.285, 10-6  
 INATM = 504.285, 10-6





EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #22 PAINTBALL MANUFACTURING EQUIPMENT (MIE)														
DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (H)	INFO. SOURCE (H)	FAIL. CONC. (H)	RATE (H)	SOURCE (H)	N.A. TM (X10-6)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	REMARKS
General Drive Motor	PSM Motor Control	7118 7001	7104	1	0103	2	16.351	8	20.381	.5	1.0	.5	2.0	First HP PC End
Switcher		7272 3185	19157	1	0109	2	NEG							
Control		30	7104	1	0110	2	NEG							
Switcher		35 16	7104	1	0112	2	NEG							
Switcher				4	0301	2	NEG							
Part				1	0304	2	20.59	16	16.472	.5	1.0	.5	2.0	Gen. End
Bearings				3	0309	2	20.59	16	16.472	.5	1.0	.5	2.0	Gen. End
Limit Switch				1	-	2	11.33	27	11.33				2.6	Second End

207

$\Delta NA = 38.956 \times 10^{-6} \text{ HR}$   
 $\Delta ENA = 16.472 \times 10^{-6}$   
 $\Delta ENA = 38.956 \times 10^{-6}$   
 $\Delta ENA = 38.956 \times 10^{-6}$

MTR =  $\frac{1}{EN}$  HRS  
 MTR =  $\frac{1}{EN}$  HRS  
 MTR =  $\frac{1}{EN}$  HRS

AVAILABILITY =  $\frac{1}{100} \times 100\% = 2$

\*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Sequence Code  
 1 - Catastrophic Failure  
 2 - Prediction Line Shutdown Failure

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (HR)	N A T M (X10 <sup>-6</sup> )
1. SPARKING	Ignition Blower Output	P 1211-B	71041	8	(421)	2	2.059	P 16 1/4 1/4 1/4 1/4	16.551	.5	1.0	.5	2.0	32.941	Gen Good
2. Motor 1/4" (1/4")		F 1123-3041	71041	1	0.304	2	16.551	X 16.551	16.551	.5	1.0	.5	2.0	32.941	Fuel HP Good
3. SPARKING		31512	71071	1	0.304	2	NEG								
4. SPARKING		31512	71071	1	0.304	2	NEG								
5. BEAR-HUBBARD CO.		31512	71071	1	0.304	2	NEG								
6. CLAMP				1	0.304	2	NEG								
7. LIMIT SWITCH				2	-	2	1/52	1/52	1/52				2.6	2.6413	Sensitive Good

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$MTBF = \frac{1}{\lambda} = \frac{1}{2.059 \times 10^{-6}} = 48,571 \text{ HRS}$   
 $MTTR = \frac{1}{\lambda} = \frac{1}{16.551 \times 10^{-6}} = 60,357 \text{ HRS}$   
 $MTBF = \frac{1}{\lambda} = \frac{1}{16.551 \times 10^{-6}} = 60,357 \text{ HRS}$   
 $MTTR = \frac{1}{\lambda} = \frac{1}{16.551 \times 10^{-6}} = 60,357 \text{ HRS}$   
 $AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\% = \frac{48,571}{48,571 + 60,357} \times 100\% = 44.4\%$

\*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure







Order Sheet No.	DESCRIPTION	QTY	UNIT	PRICE	TOTAL	REMARKS
1	ROCKET FC INPUT CONVEYOR	1	MT	1.25	1.25	
1, 2	RDW INPUT CONVEYOR	2	MT	1.25	2.50	
2, 3	ROCKET FC INPUT CONVEYOR	3	MT	1.25	3.75	
4	SECUREMENT CONVEYOR	1	MT	1.25	1.25	
5	DEMO FURNACE INPUT	1	MT	1.25	1.25	
6	ECC BYPASS	1	MT	1.25	1.25	
7	PWF INPUT	1	MT	1.25	1.25	
8	PWF TO TOWER SECTION	1	MT	1.25	1.25	
9	PWF OUTPUT CONVEYOR	1	MT	1.25	1.25	
10	INPUT CONVEYOR / REJECTOR	1	MT	1.25	1.25	
11	PWF INPUT	1	MT	1.25	1.25	
12	PWF NOSE CONVEYOR	1	MT	1.25	1.25	
13	INITIAL BURST OUTPUT	1	MT	1.25	1.25	
14	ECC BYPASS CONVEYOR	1	MT	1.25	1.25	
15	HE PUMPAGE & SECUREMENT	1	MT	1.25	1.25	

211





## (MHz)

[illegible]





# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #23 FILTER SYSTEM (FIL)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55 Rocket, 115mm, M55	GB VX	Comp B Comp B	M28 M28	636.5 "	1571.2 "	4512.6 "	7.09 "	.99 "
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360 Projectile, 155mm, M121A1 Projectile, 155mm, M121 Projectile, 155mm, M122 Projectile, 8", M426 Projectile, 155mm, M121A1	GB GB GB GB GB VX	None None None None None None	None None None None None None	636.4 " " " " "	1571.4 " " " " "	4512.6 " " " " "	7.09 " " " " "	.99 " " " " "
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	970.3	1030.6	6879.4	7.09	.99
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110 Projectile, 155mm, M104	H HD	Tetrytol Tetrytol	None None	" "	" "	" "	" "	" "
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	553.2	1207.7	3925.4	7.10	.99
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1 Cartridge, Mortar, 4.2", M2/M2A1	HD HT	Tetryl Tetryl	M6 M6	867.0 "	1127.4 "	6291.3 "	7.09 "	.99 "

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #23 FILTER SYSTEM (FIL)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX	338, 300, 400, 800, 1500 (2P)							
Bomb, 750#, MC-1	GB	None	None	553.1	1808.0	3925.0	7.10	.99
Tank, Spray, TMU-28/B	VX	None	None	"	"	"	"	"
Ton Container	GB	None	None	"	"	"	"	"
Ton Container MK94 Combs	VX	None	None	"	"	"	"	"
*TON CONTAINER, MUSTARD	333, 400, 800, 1500 (2P)							
Ton Container	HD	None	None	459.3	2177.2	5261.9	7.10	.99

SUPPLEMENTAL DATA

BUILDING BLOCK

# 23 FILTERSYSTEM (FIL)  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES Drawing No's are referenced on failure rate and maintainability data  
sheets

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER RADC-TR-74-268 RADC-TR-69-458

2. NOTES Estimates were made where data not available

## C. MAINTENANCE DATA

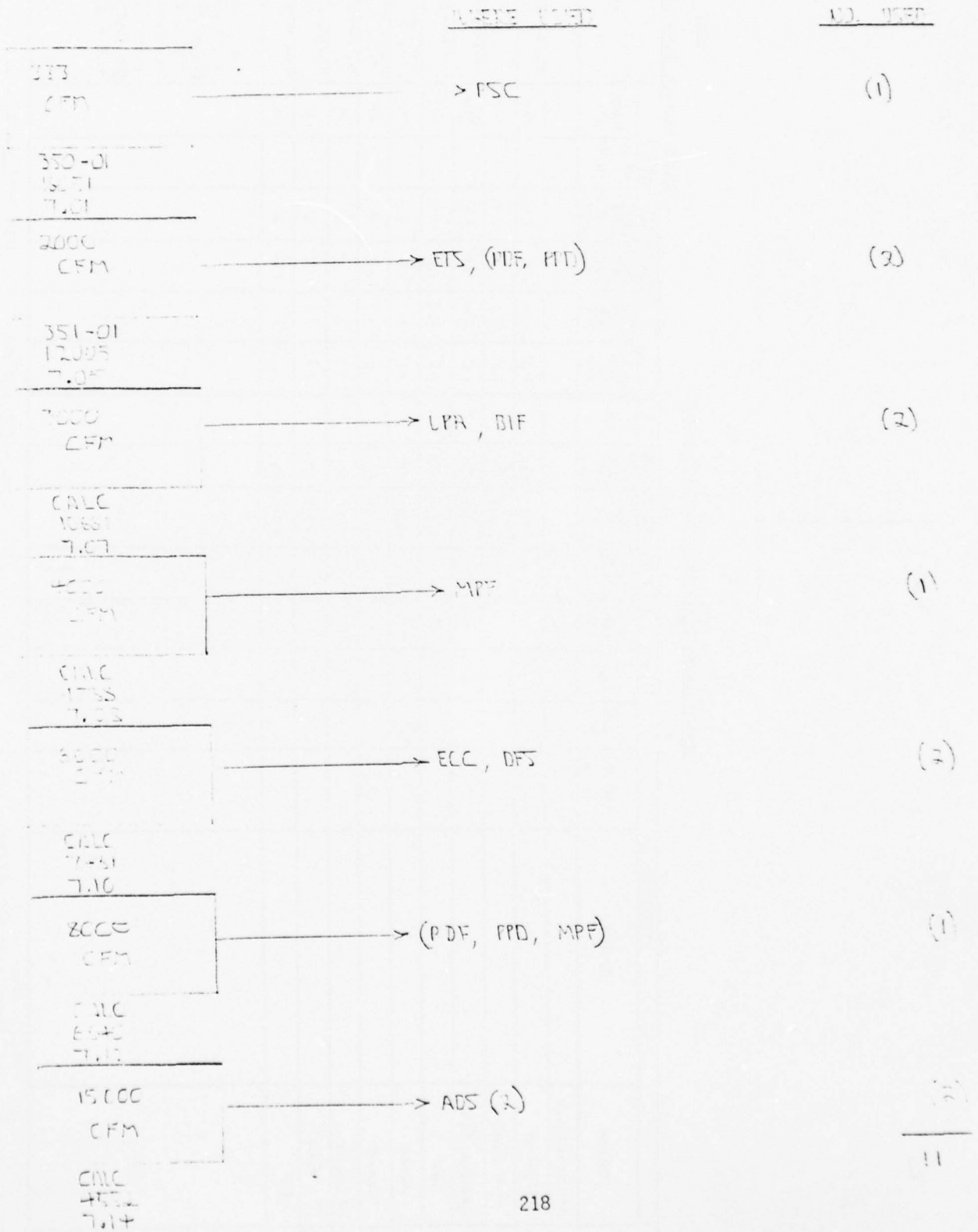
## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER RADC-TDR-64-373 Vol II

2. NOTES Estimates were made where actual data not available

## D. GENERAL REMARKS

BUILDING BLOCK: #23 FILTER SYSTEM (FIL)  
CAPACITY UTILIZATION DIAGRAM





11/14/75

SHEET 1 OF 1

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #23 FILTER SYSTEM (FIL)

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT. TIME $T_M \times 10^{-6}$ (HR)	N A T M $(\times 10^{-6})$	SOURCE (*)
1 353 CFM FILTER					Q-01											FIN-219-920
1 PRE FILTER				1	"		2.937	P21		1.5	4.2	1.5	7.2		P21	"
2 HEPA FILTER				2	"		2.937	P21		1.5	4.2	1.5	7.2		P21	
3 CHARCOAL FILTER				2	"		1.201	P21		1.5	4.2	1.5	7.2		EST. SOME 45%.	
1 FAN				1	"		1.229	P17		1.5	10.8	1.5	13.8		P17	FAUCONRA 910
1 MOTOR				1	"		4.825	P25		1.5	6	1.5	9		P25	THUR SUP
1 DAMPER				1	"		8.341	P25		1.5	6	1.5	9		EST. 15% + 75%	THUR SUP + VARIOUS SUP. IN
7 DRAINAGE				6	"		.537	P25		1.5	3	1.5	6		P25	Interim motor good for 40
1 FLOW				1	"		24.975	P40		1.5	3	1.5	6		P40	2000 CFM Rebuilding
1 DP				1	"		7.435	P40		1.5	3	1.5	6		P40	2000 CFM Rebuilding
THE 2000 CFM FILTER IS SIMILAR TO ABOVE EXCEPT FOR NO. OF PRE, HEPA, & CHARCOAL FILTERS. THE OTHER 3 PRE FILTER SYSTEMS (TO 1500 CFM) ARE SCALED FROM THE 333 & 2000 CFM SYSTEM																

A. ECOS 23-550 -  
 B. See OLMOS FSA REF FOLDER  
 \*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Sequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Breaker During Maintenance Period  
 MTBF =  $\frac{1}{\text{ENA}}$  = 1 HRS  
 ENA =  $62.33 \times 10^{-6}/HR$   
 MTTR =  $\frac{1}{\text{MTR}}$  = 1 HRS  
 MTR =  $\frac{1}{\text{MTR}}$  = 1 HRS  
 INATH =  $\frac{1}{\text{INATH}}$  = 1 HRS  
 INATH =  $434.64 \times 10^{-6}$   
 AVAILABILITY =  $\frac{1}{1 + \frac{\text{MTR}}{\text{MTBF}}} \times 100\% = 99.9\%$

*Belmont & Co. N.Y.C.*

[illegible][illegible]

1910-1911 1875-1876 1877-1878

$$Q. \text{ I.I.I.} = 62.32 \div \frac{3.442}{333} \times 0.01 \quad \text{WATER} \quad 3.442 = 20.971832 \quad 2013$$

$$\begin{aligned} \text{D. } \Sigma N \lambda T_1 &= 436.64 + 25.140 \times 0.971 \times 333 \\ &= 587.631 \times 333 \\ &= 195,711 \times 333 \\ &= 65,181,783 \end{aligned}$$

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #24 MORTAR DEMIL MACHINE (MOR)

1/2  
12/31/51

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVAIL ABTL
*M55 ROCKET, GB/VX								
Rocket, 115mm, M55	GB	Comp B	M28	NA	NA	NA	NA	1
Rocket, 115mm, M55	VX	Comp B	M28	NA	NA	NA	NA	1
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	NA	NA	NA	NA	1
Projectile, 155mm, M121A1	GB	None	None	NA	NA	NA	NA	1
Projectile, 155mm, M121	GB	None	None	NA	NA	NA	NA	1
Projectile, 155mm, M122	GB	None	None	NA	NA	NA	NA	1
Projectile, 8", M426	GB	None	None	NA	NA	NA	NA	1
Projectile, 155mm, M121A1	VX	None	None	NA	NA	NA	NA	1
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	NA	NA	NA	NA	1
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	NA	NA	NA	NA	1
Projectile, 155mm, M104	HD	Tetrytol	None	NA	NA	NA	NA	1
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None	NA	NA	NA	NA	1
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1 50/42	HD	Tetryl	M6	922.4	1084.08	13027.7	14.12	93.
Cartridge, Mortar, 4.2", M2/M2A1 50/42	HT	Tetryl	M6	922.44	1084.08	13027.7	14.12	93.

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

1/2

BUILDING BLOCK: #24 MORTAR DEMIL MACHINE (MOR)

12/31/75

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVA ABI
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NA	NA	NA	NA	1
Tank, Spray, TMU-28/B	VX	None	None	NA	NA	NA	NA	1
Ton Container	GB	None	None	NA	NA	NA	NA	1
Tone Container	VX	None	None	NA	NA	NA	NA	1
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	1

SUPPLEMENTAL DATA

BUILDING BLOCK

#24 NYKTEK

POM. MAJ. J.

## A. DESCRIPTION SEE ATTACHMENT

## 1. SOURCE

a. DRAWING NO. \_\_\_\_\_ DATE: \_\_\_\_\_

b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_

c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

## 2. NOTES \_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_

b. OTHER \_\_\_\_\_

## 2. NOTES \_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_

b. TEAD/EA \_\_\_\_\_

c. OTHER \_\_\_\_\_

## 2. NOTES \_\_\_\_\_

## D. GENERAL REMARKS



11/31/75

## DATA SOURCES

VERBAL & DRAFT SKETCHES OBTAINED  
AT TOOLE 10/21/75

DRAFT DEMIL PLAN

### MISSING ELEMENTS INCLUDE:

ROLLERS, MECHANISMS, ETC

### DEVELOPMENT OF FACTOR FOR MISSING ELEMENTS

	FUNCTIONS				
	SAW	PUNCH	DRAIN	UNSCREW	CONDUCTORS
RDM #6	✓	✓	✓		✓
PPDM #15	✓			✓	✓
PPD #18			✓	✓	✓
MIN #25		✓	✓	✓	✓ (SERIES)
MOR #24				✓	

COMPARISON ANALYSIS MOR TO MIN

#### COMPONENTS

#### QUANTITY

	MOR	MIN
CYLINDERS HYD	6	20 (2ea for PUNCH)
MOTORS	1 HYD	3 HYD/EL
SWITCHES ALL TYPES	10	17
PUMPS D.P.	0	2
VALVES	0	4
	17ea	46
		- 8 PUNCH & DRAIN
		38ea

12/5/75

• DEVELOPMENT OF FACTOR FOR MISSING ELEMENTS (CONTINUED)

$$\text{Factor} = \frac{17(\text{MOR})}{46(\text{MIN})} \times \frac{38 \text{ MIN APPL PARTS}}{46 \text{ MIN TOTAL}} = .305$$

	MOR	MIN
$\Delta \Sigma N2$	122.992	669.2666
$\Sigma N2$	0	98.888 NOT APPLICABLE FOR MOR

$$669.2666 \times .305 = 204.126$$

$$204.126 \div 122.992 = 1.660$$

REDUCE TO 1.5 IN CONSIDERING OTHER CYCLICAL ITEMS NOT LISTED BUT PART OF PUNCH, DRAIN OPERATIONS

	MOR	MIN
$\Delta \Sigma N2TM$	521.103	2338.5826
$\Sigma N2TM$	0	335.496 NOT APPLICABLE FOR MOR

$$2338.5826 \times .305 = 713.268$$

$$713.268 \div 521.103 = 1.369$$

REDUCE TO 1.25 IN CONSIDERING OTHER CYCLICAL ITEMS NOT LISTED BUT PART OF PUNCH DRAIN OPERATIONS

A CONSERVATIVE ESTIMATE OF IMPACT OF NON IDENTIFIED PARTS

12/31/51

DEVELOPMENT OF FACTOR FOR MISSING ELEMENTS  
(CONTINUED)

COMPONENTS	MOR	MIN (MACHINE ONLY)
CYLINDERS HYD	6	13 (2 PUNCHES)
MOTORS	1 HYD	1
SWITCHES	10	10
PUMPS	0	2 ] NOT APPL
VALVES	0	0 ] 10
	17	34
		12 + 12
		22

$$\text{FACTOR} = \frac{17}{34} \times \frac{22}{34} = .3235$$

	MOR	MIN
$\Delta \Sigma H$	122.992	416.922
$\Sigma H$	0	31.53 NOT APPLICABLE

$$416.922 \times .3235 = 134.874$$

$$\frac{134.874}{122.992} = 1.097$$

	MOR	MIN
$\Delta \Sigma NRTM$	521.108	1529.6942
$\Sigma NRTM$	0	63.06 NOT APPLICABLE

$$1529.6942 \times .3235 = 494.85607$$

$$\frac{494.856}{521.108} = .9496$$

ADJUSTMENT IS ADEQUATE FOR MISSING  
ITEMS

4/1  
12/31/75

BUILDING BLOCK: #24 MORTAR DEMIL MACHINE (MOR)

# DEVELOPMENT OF FACTOR FOR MISSING ELEMENTS (CONTINUED)

COMPONENTS	MOR	RDM
CYLINDER HEAD	6	3, 1, 6, 2, 20 = 34
MOTORS	1 HEAD	1, 6 = 7 (6 SAW)
SWITCHES	10	7, 3, 1, 2, 7 = 29
PUMPS	0	1 = 1
VALVES	0	1, 1, 2, 6, 3, 2 = 15
SAW BLADES	0	4, 2, 1 = 7
	<u>17</u>	93 29 NOT APPL
		<u>29</u> 64

$$\text{FACTOR} = \frac{17}{93} \times \frac{64}{93} = .1258$$

	MOR	RDM
ΔΣN2	122.992	885.133
ΣN2	0	59.142 NOT APPL 18

$$885.133 \times .1258 = 111.350$$

	MOR	RDM
ΔΣN2TM	521.108	3207.442
ΣN2TM	0	120.912 NOT APPLICABLE

$$3207.442 \times .1258 = 403.496$$

CONCLUSION - FACTORING RDM YIELDS LOWER  
NUMBER THAN ALREADY IDENTIFIED MOR  
ITEMS.

BUILDING BLOCK: #24 MORTAR DEMIL MACHINE (MOR)

DEVELOPMENT OF FACTOR MISSING ELEMENTS (CONTINUED) <sup>5</sup>  
12/31/75

CALCULATION W/O ADJUSTMENT FOR MISSING  
ITEMS

$$\Delta N2 = 122.992 \times 5 = 614.96 \quad \text{MTBF} = 1/6 \text{ } 20.122$$

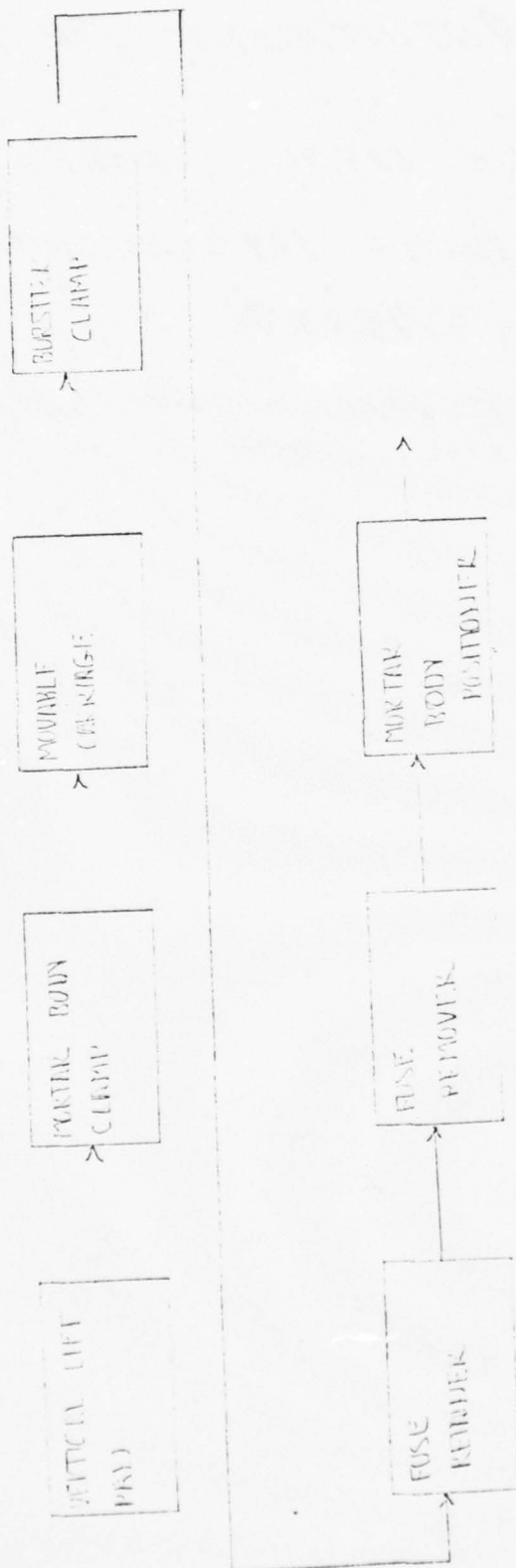
$$\Delta N2TM = 521.108 \times 5 \times 3 \times 1/3 = 10422.16 \quad \text{MTTR} = 16.943$$

$$\text{AVAIL} = \frac{100}{1.0104223} = 98.97\%$$

BEST POSSIBLE AVAILABILITY WITHOUT  
CONSIDERING MISSING PARTS



BUILDING BLOCK: #24 MORTAR DEMIL MACHINE (MOR)  
FLOW CHART



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #24 MORTAR DEMIL MACHINE

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)		NATH ( $\times 10^{-6}$ )	SOURCE (*)	
GRINDER HWD	VERTICAL LIFT PIN			1		2	15.228	P15	15.228				4.0	4.0	60.912	P15	Act Low HWD GND
GRINDER HWD	GRATE BODY CLAMP MECH			1		2	15.228	P15	15.228				4.0	4.0	60.912	P15	Act Low HWD GND
GRINDER HWD	GRATE MECH			1		2	NEG										
GRINDER HWD	MOVABLE CARTRIDGE			1		2	15.228	P15	15.228				4.0	4.0	60.912	P15	Act Low HWD GND
GRINDER HWD	GRATE MECH			4		2	20.59	P15	8.236				8.0	8.0	65.593	EST	Reborns Run GND
GRINDER HWD	GRATE MECH			1		2	15.228	P15	15.228				4.0	4.0	60.912	P15	Act Low HWD GND
GRINDER HWD	FINE RETAINER			1		2	15.228	P15	15.228				4.0	4.0	60.912	P15	Act Low HWD GND
GRINDER HWD	FORK			1		3	NEG										

$$\Delta \text{ENA} = 24.572 \times 10^{-6} / \text{HR}$$

$$\Delta \text{ENATH} = 770.448 \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Grate Mechs in Excess of 100% Defect

$$\text{MTBF} = \frac{1}{\text{ENA}} = \frac{1}{15.228} \text{ HRS}$$

$$\text{MTR} = \frac{\text{ENATH}}{\text{ENA}} = \frac{770.448}{15.228} \text{ HRS}$$

$$\text{INATH} = \frac{\text{ENATH}}{\text{ENA}} = \frac{770.448}{15.228} \text{ HRS}$$

$$\text{AVAILABILITY} = \frac{1}{1 + \frac{\text{MTR}}{\text{MTBF}}} \times 100\% = \frac{1}{1 + \frac{770.448}{15.228}} \times 100\%$$

$$\Delta \text{CYCLE ITEM}$$

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK#24 MORTAR DEMIL MACHINE (MOR)

ITEM NO.	DESCRIPTION			FAILURE DATA						MAINTAINABILITY DATA					REMARKS		
	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA $\Delta$	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)		NA TH ( $\times 10^{-6}$ ) $\Delta$	SOURCE (*)
10	1. Trigger Mine Hvy	Fuse Remover	109-1005	109-1005	1		2	12.033	p 30	12.033				5.0	60.21	p 30	Run Contre Gen Gnd
20	2. Device Head				1		2	NEG									
30	3. Calibrator, NPD	Mortar Body Remover			1		2	15.228	p 30	15.228				4.0	60.912	p 15	Art Lw H10 Gnd
40	4. Switches	Instrumentation			10		2	11.33	p 37	11.33				2.6	27.438	p 37	Sw Semi Gnd

$$\Delta NA = \frac{27.438}{10} \times 10^{-6} / \text{HR} \quad \Delta INATM = \frac{12.033}{10} \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failu onsequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

$$MTBF = \frac{1}{\lambda} = \frac{1}{12.033} \times 10^6 \text{ HRS}$$

$$MTR = \frac{INATM}{\lambda} = \frac{12.033}{12.033} \times 10^6 \text{ HRS}$$

$$HRS$$

$$AVAILABILITY = \frac{1}{1 + MTR \times 100\%} = \frac{1}{1 + 100\%} = 0.5$$



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #25 MINE DEMIL MACHINE (MIN)

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA TM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	NA	NA	NA	NA	1
Rocket, 115mm, M55	VX	Comp B	M28	NA	NA	NA	NA	1
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121A1	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M122	GB	None	None	NA	NA	NA	NA	NA
Projectile, 8", M426	GB	None	None	NA	NA	NA	NA	NA
Projectile, 155mm, M121A1	VX	None	None	NA	NA	NA	NA	NA
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	NA	NA	NA	NA	NA
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	NA	NA	NA	NA	NA
Projectile, 155mm, M104	HD	Tetrytol	None	NA	NA	NA	NA	NA
*M23 MINE, VX <i>40/NA</i>								
Mine, 2 gallon, M23	VX	Comp B	None	2775.7044	36.24	2075.204	13.96	96.
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M5	NA	NA	NA	NA	NA
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M5	NA	NA	NA	NA	NA

\*MUNITION DEMILITARIZATION PROCESS FLOW



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #25 MINE DEMIL MACHINE (MIN)

12/24/

MUNITION	AGENT	EXP.	PROP.	NA	MTBF	NA <sub>TM</sub>	MTTR	AVAIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	NA	NA	NA	NA	16
Tank, Spray, TMU-28/B	VX	None	None	NA	NA	NA	NA	16
Ton Container	GB	None	None	NA	NA	NA	NA	16
Tone Container	VX	None	None	NA	NA	NA	NA	16
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	NA	NA	NA	NA	16

SHEET 1 OF 3

SUPPLEMENTAL DATA

BUILDING BLOCK

# 25 MIA

12/25/75 Aug

A. DESCRIPTION

1. SOURCE

a. DRAWING NO. See Appendix in Source DATE: \_\_\_\_\_  
b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

B. FAILURE DATA

1. SOURCE

a. CUSTOMER \_\_\_\_\_  
b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

C. MAINTENANCE DATA

1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_  
b. TEAD/EA \_\_\_\_\_  
c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

D. GENERAL REMARKS

BB # 25 MIN

14/5/75 <sup>2/3</sup>

Drawings :

25-205-06 30 JUN 74

25-309-32 13 AUG 72

-33 24 JUL 72

-34 26 JUL 72

25-313-1 1 DEC 72

-2 12 DEC 72

-3 18 DEC 72

-4 2 MAR 73

-5 27 FEB 73

-6 8 MAR 73

-7 NO DATE

25-31-2 8 MAR 73

-3 18 DEC 72

-5 27 FEB 73

25-405-4/19 8 FEB 72

-6/19 13 MAR 72

-8/19 22 MAR 72

-11/19 1 JUN 72

-17/19 22 JUN 73

25-406-1/9 26 NOV 73

-2/9 NOV 21-73

-3/9 30 OCT 73

-4/9 10 OCT 73

-5/9 17 OCT 73

-6/9 12 NOV 73

-8/9 17 AUG 73

REV 1 11 JUN 7

REV 3 23 DEC 7

25-407-1 27 FEB 74

-3 18 APR 73

-4 30 MAR 73

-5 25 DEC 73

-6 29 MAY 75

REV 1 13 JUL 7

BB\*25 MIN

14/27

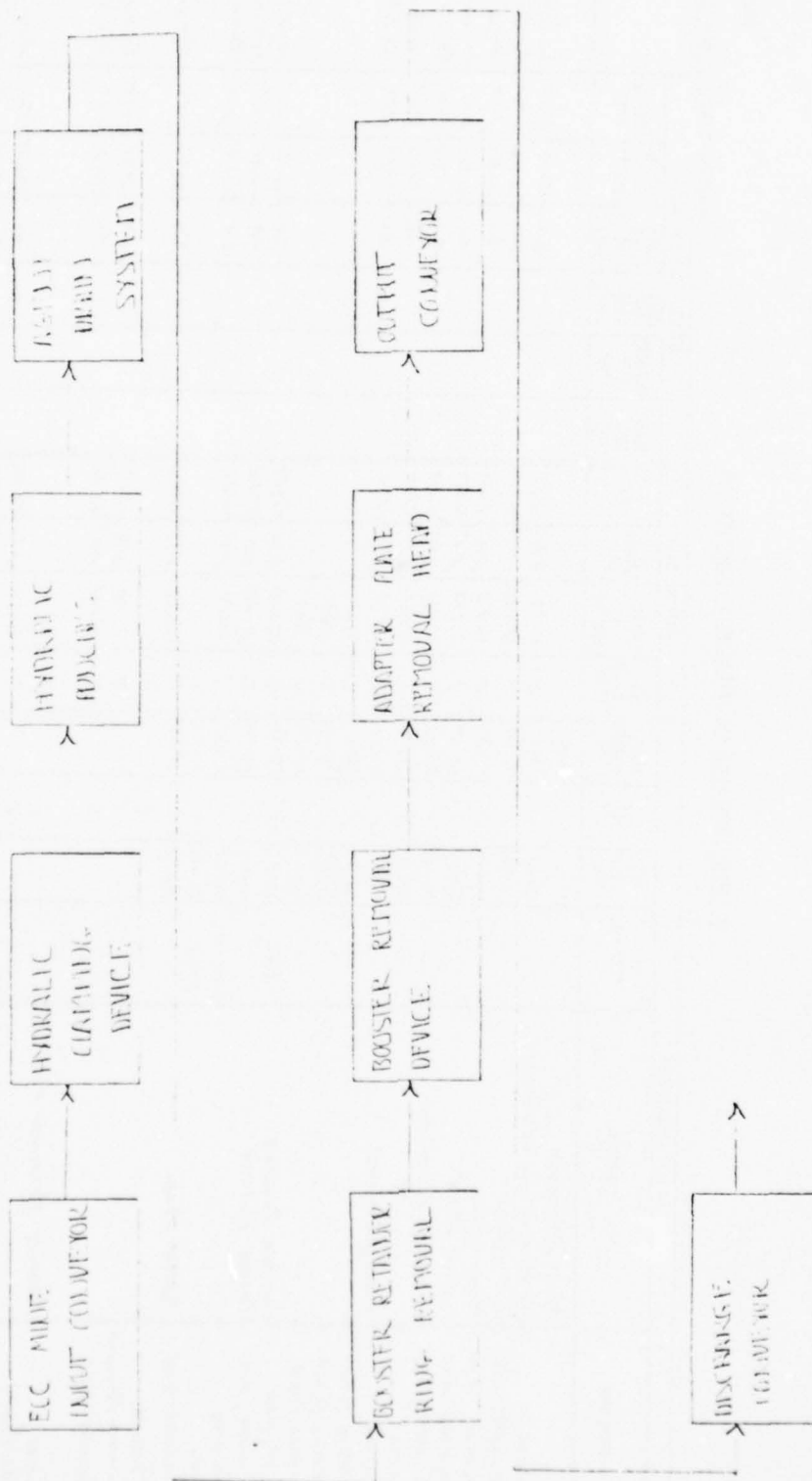
Drawings (Continued):

25-407 - 7 6 DEC 73  
- 8 11 DEC 73  
- 9 11 DEC 73  
- 10 14 DEC 73  
- 11 18 DEC 73  
- 12 19 DEC 73  
- 13 21 DEC 73  
- 14 23 JAN 74  
- 15 8 JAN 74  
- 16 10 JAN 74  
- 17 11 JAN 74  
- 18 15 JAN 74  
- 19 16 JAN 74  
- 20 21 JAN 74  
- 21 29 MAY 75  
- 22 23 JAN 74  
- 23 24 JAN 74  
- 24 30 JAN 74  
- 25 10 JUL 74

25-539 - 1/3 13 FEB 73 REV 1 30 APR 7  
- 2/3 14 FEB 73 REV 1 30 APR 7  
- 3/3 15 FEB 73 REV 1 30 APR 7

25-607 - 02 No DATE

BUILDING BLOCK: #25 MINE DEMIL MACHINE (MIN)  
FLOW CHART





BUILDING BLOCK #25 MINE DEMIL MACHINE (MIN)															
DESCRIPTION			FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MEG. CODE NO.	QTY	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)		REPAIR TIME (HR)	CHECK-OUT TIME (HR)	N A TM (X10 <sup>-6</sup> )	SOURCE (*)
1 Switch	Mine Planning				(100)										
2 CRANKER, HYD	HYD PISTON-PIN OUT BUSTER			1	32-10	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
3 CRANKER, HYD	HYD PISTON			1	32-105	2	15-228	p 15 2/3	15-228			40	160912	p 15	Act Lin HYD GND
4 CRANKER, HYD	HYD PISTON			1	32-150	2	15-228	p 15 2/3	15-228			40	160912	p 15	Act Lin HYD GND
5 CRANKER, HYD	HYD PISTON			1	32-151	2	15-228	p 15 2/3	15-228			40	160912	p 15	Act Lin HYD GND
6 CRANKER, HYD	HYD PISTON			1	32-152	2	15-228	p 15 2/3	15-228			40	160912	p 15	Act Lin HYD GND
7 CRANKER, HYD	HYD PISTON			1	32-153	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
8 CRANKER, HYD	HYD PISTON			1	32-154	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
9 CRANKER, HYD	HYD PISTON			1	32-155	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
10 CRANKER, HYD	HYD PISTON			1	32-156	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
11 CRANKER, HYD	HYD PISTON			1	32-157	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
12 CRANKER, HYD	HYD PISTON			1	32-158	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
13 CRANKER, HYD	HYD PISTON			1	32-159	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
14 CRANKER, HYD	HYD PISTON			1	32-160	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
15 CRANKER, HYD	HYD PISTON			1	32-161	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
16 CRANKER, HYD	HYD PISTON			1	32-162	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
17 CRANKER, HYD	HYD PISTON			1	32-163	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
18 CRANKER, HYD	HYD PISTON			1	32-164	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
19 CRANKER, HYD	HYD PISTON			1	32-165	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
20 CRANKER, HYD	HYD PISTON			1	32-166	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
21 CRANKER, HYD	HYD PISTON			1	32-167	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
22 CRANKER, HYD	HYD PISTON			1	32-168	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
23 CRANKER, HYD	HYD PISTON			1	32-169	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
24 CRANKER, HYD	HYD PISTON			1	32-170	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
25 CRANKER, HYD	HYD PISTON			1	32-171	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
26 CRANKER, HYD	HYD PISTON			1	32-172	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
27 CRANKER, HYD	HYD PISTON			1	32-173	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
28 CRANKER, HYD	HYD PISTON			1	32-174	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
29 CRANKER, HYD	HYD PISTON			1	32-175	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
30 CRANKER, HYD	HYD PISTON			1	32-176	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
31 CRANKER, HYD	HYD PISTON			1	32-177	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
32 CRANKER, HYD	HYD PISTON			1	32-178	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
33 CRANKER, HYD	HYD PISTON			1	32-179	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
34 CRANKER, HYD	HYD PISTON			1	32-180	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
35 CRANKER, HYD	HYD PISTON			1	32-181	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
36 CRANKER, HYD	HYD PISTON			1	32-182	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
37 CRANKER, HYD	HYD PISTON			1	32-183	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
38 CRANKER, HYD	HYD PISTON			1	32-184	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
39 CRANKER, HYD	HYD PISTON			1	32-185	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
40 CRANKER, HYD	HYD PISTON			1	32-186	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
41 CRANKER, HYD	HYD PISTON			1	32-187	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
42 CRANKER, HYD	HYD PISTON			1	32-188	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
43 CRANKER, HYD	HYD PISTON			1	32-189	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
44 CRANKER, HYD	HYD PISTON			1	32-190	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
45 CRANKER, HYD	HYD PISTON			1	32-191	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
46 CRANKER, HYD	HYD PISTON			1	32-192	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
47 CRANKER, HYD	HYD PISTON			1	32-193	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
48 CRANKER, HYD	HYD PISTON			1	32-194	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
49 CRANKER, HYD	HYD PISTON			1	32-195	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
50 CRANKER, HYD	HYD PISTON			1	32-196	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
51 CRANKER, HYD	HYD PISTON			1	32-197	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
52 CRANKER, HYD	HYD PISTON			1	32-198	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
53 CRANKER, HYD	HYD PISTON			1	32-199	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
54 CRANKER, HYD	HYD PISTON			1	32-200	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
55 CRANKER, HYD	HYD PISTON			1	32-201	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
56 CRANKER, HYD	HYD PISTON			1	32-202	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
57 CRANKER, HYD	HYD PISTON			1	32-203	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
58 CRANKER, HYD	HYD PISTON			1	32-204	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
59 CRANKER, HYD	HYD PISTON			1	32-205	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
60 CRANKER, HYD	HYD PISTON			1	32-206	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
61 CRANKER, HYD	HYD PISTON			1	32-207	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
62 CRANKER, HYD	HYD PISTON			1	32-208	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
63 CRANKER, HYD	HYD PISTON			1	32-209	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
64 CRANKER, HYD	HYD PISTON			1	32-210	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
65 CRANKER, HYD	HYD PISTON			1	32-211	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
66 CRANKER, HYD	HYD PISTON			1	32-212	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
67 CRANKER, HYD	HYD PISTON			1	32-213	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
68 CRANKER, HYD	HYD PISTON			1	32-214	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
69 CRANKER, HYD	HYD PISTON			1	32-215	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
70 CRANKER, HYD	HYD PISTON			1	32-216	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
71 CRANKER, HYD	HYD PISTON			1	32-217	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
72 CRANKER, HYD	HYD PISTON			1	32-218	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
73 CRANKER, HYD	HYD PISTON			1	32-219	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
74 CRANKER, HYD	HYD PISTON			1	32-220	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
75 CRANKER, HYD	HYD PISTON			1	32-221	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
76 CRANKER, HYD	HYD PISTON			1	32-222	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
77 CRANKER, HYD	HYD PISTON			1	32-223	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
78 CRANKER, HYD	HYD PISTON			1	32-224	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
79 CRANKER, HYD	HYD PISTON			1	32-225	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
80 CRANKER, HYD	HYD PISTON			1	32-226	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
81 CRANKER, HYD	HYD PISTON			1	32-227	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
82 CRANKER, HYD	HYD PISTON			1	32-228	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
83 CRANKER, HYD	HYD PISTON			1	32-229	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
84 CRANKER, HYD	HYD PISTON			1	32-230	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
85 CRANKER, HYD	HYD PISTON			1	32-231	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
86 CRANKER, HYD	HYD PISTON			1	32-232	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
87 CRANKER, HYD	HYD PISTON			1	32-233	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
88 CRANKER, HYD	HYD PISTON			1	32-234	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
89 CRANKER, HYD	HYD PISTON			1	32-235	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
90 CRANKER, HYD	HYD PISTON			1	32-236	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
91 CRANKER, HYD	HYD PISTON			1	32-237	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
92 CRANKER, HYD	HYD PISTON			1	32-238	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
93 CRANKER, HYD	HYD PISTON			1	32-239	2	1135	p 37 1/2	1133			2.6	13908	p 37	Sw Seal GND
94 CRANKER, HYD															

Information is detailed in Supplemental Data Sheet

Failure	Sequence Code
1	1
2	2
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89	89
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94	94
95	95
96	96
97	97
98	98
99	99
100	100

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS	
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE λ (X10 <sup>-6</sup> /HR)	SOURCE (*)	N/A	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> )		SOURCE (*)
7 Seal, Rotator Drive Seal Drive At Arm Pinion				2	SEAL	3									
8 Seal, Drive				2	SEAL	3									
9 Pinion, Dia				1	SEAL	2	1.058	p 31 B 12052							
10 Seal ΔP				2	SEAL	3									
11 Valve High Pressure System				1	SEAL	2	8.416	p 45 B 416							
12 Valve Flow Sol ΔP System				1	SEAL	2	10.250	p 45 B 1250							

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$$\Delta_{\text{IN}} = 1230^{\circ}\text{V} \times 10^{-6}/\text{HR} \quad \Delta_{\text{INATM}} = 427^{\circ}\text{V} \times 10^{-6}$$

•Information is detailed in Supplemental Data Sheet

- Information is detailed in
- Failure Consequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

$$\text{MTDF} = \frac{1}{\frac{1}{\text{ZNA}}} = \frac{1}{\text{ZNA}} = \frac{1}{\text{HRS}} = \frac{1}{\text{HRS}} = \frac{\text{ZNA} \cdot \text{HRS}}{\text{HRS}} = \frac{\text{ZNA} \cdot \text{HRS}}{\text{HRS}}$$
$$\text{AVAILABILITY} = \frac{1}{\text{MTR}} \times 100\% = \underline{\hspace{2cm}}\%$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #25 MINI DEMIL MACHINE (MIN)

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA $\Delta$	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL MAINT. TIME $T_M (X10^{-6})$	NA $\Delta$	SOURCE (*)
CASPER	Mini Inert Converter	106-5	Indal 172	1	8-85	3	2059	p16	2059				20	8119	p16	FEARING GEN GND
SWITCHES, CYCLO		B 3177-16	11020	1	3-72	2	2059	p16	2059				20	4118	p16	FEARING GEN GND
FEARING		EW	11020	1	5-93	2	2059	p16	2059				20	5042	p16	FEARING GEN GND
WAVE W Freq Converter	VELOCITY	106-10-1	11020	2	11-88	2	8,416	p16	16,832				20		p16	FEARING GEN GND
VELOCITY		AD 32	11020	1	11-84	2	NEG									
CABLE		STO 3040	11020	1	11-87	2	NEG						2.6	2449	p37	SW GEN GND
SWITCH		CE 177	11020	1	11-88	2	1,133	p37	1,133				2.0	72	EST	CABLE GND
CONVERTER		CE 177	11020	1	11-88	2	1,133	p37	1,133				2.6	2702	p37	SW GEN GND
SWITCH		CE 177	11020	1	11-88	2	22,842	p16	22,842				4.0	4138	p16	FEARING GEN GND
100 WAVE CABLE		CE 177	11020	1	11-88	2	1,133	p37	1,133				2.6	2449	p37	SW GEN GND
41		CE 177	11020	1	11-88	2	1,133	p37	1,133				2.6	2449	p37	SW GEN GND
WAVE CABLE		CE 177	11020	1	11-88	2	2,059	p16	4,118				2.0	8226	p16	FEARING GEN GND
WAVE CABLE		CE 177	11020	1	11-88	2	2,059	p16	4,118				2.0	8226	p16	FEARING GEN GND

$$\Delta ENA = 52.9 \times 10^{-6} / HR \quad \Delta ENATM = 17.0 \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Sequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Does Not Affect Performance

$$MTBF = \frac{1}{\Delta ENA} \quad HRS \quad MTTR = \frac{1}{\Delta ENATM} \quad HRS$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #25 MINE DEMIL MACHINE (MIN)

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS					
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL MAINT TIME $TM \times 10^{-6}$	N.A.T.M	SOURCE (*)	
KROHNE FLOWMETER END FLOW DISM Y MOTOR UNIT Drive Assembly	INSIDE CONVEYOR	C737-15	3105	2	3105	2	205.8/100	p16	236				2.0	11.472	p16	WATERING GEN GND	
		C770-15	3109	2	3105	2	205.8/100	p16	247.0				2.0	47.716	p16	WATERING GEN GND	
				1	3106	2	7.552	p18	7.552					2.0	15.104	p22	WATERING GEN GND
		C741-15-12	3109	1	3107	2	11.726	p27	11.716					6.0	70.522	p27	WATERING GEN GND
Hudson Rho Service Gate Service Unit Gate Transfer Transfer HVD Switch	4-DUMP CHUTE	P812-ADT	3109	4	3102	2	396	p16	7.704				8.0	30.272	p16	WATERING SILL GND	
		S812	3109	4	3103	2	396/100	p16	7.536					8.0	10.544	p16	WATERING SILL GND
		101	3109	4	3104	2	796	p16	7.784					8.0	30.272	p16	WATERING SILL GND
		Transfer HVD	3109	1	3106	2	15.228	p15	15.228					4.0	60.912	p15	WATERING SILL GND
			3109	1	3102	2	1.128	p17	1.128				2.0	2.982	p37	WATERING SILL GND	

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$MTBF = \frac{1}{\lambda} = \frac{1}{205.8/100} = 0.486 \text{ HRS}$   
 $MTTR = \frac{1}{\lambda} = \frac{1}{7.552} = 0.132 \text{ HRS}$   
 $MTBF \times 100\% = 48.6\%$   
 $MTTR \times 100\% = 13.2\%$   
 $AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\% = 78.3\%$

\*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #25 MINE DEMIL MACHINE (MIN)

DESCRIPTION						FAILURE DATA				MAINTAINABILITY DATA					REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA $\Delta$	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	NATM (X10 <sup>-6</sup> )	
1. Diagnostic Converter					(107)										
2. End Point Assembly		C643	114000	1	0301	2	NEG						2.0	24.205	p16
3. Converter Drive		C770	114000	1	0302	2	20.5/40.0	p16	12.314						
4. Motor Drive		C710	114000	1	0303	2	7.532	p25	7.582				6.0	70.372	p27
5. Drive Motor				1		2	11.726	p27	11.726						
6. Drive Motor				1		2	NEG								
7. Drive Motor		C770-100	114000	1	0304	2	NEG								
8. Drive Motor		C770-100	114000	1	0308	2	2.059	p16	2.059				2.0	4118	p16
9. Drive Motor		C770-100	114000	1	0309	2									
10. Drive Motor		C770-100	114000	1	0310	2									
11. Drive Motor		C770-100	114000	1	0311	2	2.059/5.0	p16	4.118				2.0	2.276	p16
12. Drive Motor		C770-100	114000	1	0312	2	22.042	p15	22.042				4.0	71.316	p15
13. Drive Motor		C770-100	114000	1	0313	2	11.13	p27	11.13				2.0	29.473	p37
14. Drive Motor		C770-100	114000	1	0314	2	11.13/6.5	p15	22.484				4.0	10.576	p15
15. Drive Motor		C770-100	114000	1	0315	2	10.576/6.5	p27	11.623				2.0	21.224	p27
16. Drive Motor		C770-100	114000	1	0316	2	10.576/6.5	p27	11.623				2.0	45.124	p27
17. Drive Motor		C770-100	114000	1	0317	2	11.13	p37	11.13				2.0	29.473	p37
18. Drive Motor		C770-100	114000	1	0318	2	10.576	p15	30.756				4.0	11.624	p15

$$\Delta ENA = 18.1026 \times 10^{-6} / HR \quad \Delta ENATM = 5.7759 \times 10^{-6}$$

$$MTBF = \frac{1}{EN} = \frac{1}{1} = 1 \text{ HRS} \quad MTR = \frac{ENATM}{EN} = \frac{5.7759 \times 10^{-6}}{1} = 5.7759 \times 10^{-6} \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + MTR \times 100\%} = \frac{1}{1 + 5.7759 \times 10^{-6} \times 100\%} = 99.9999422\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure sequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure





# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: NO. 26 PIPING (PID)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	50.775	19,695	149.496	2.94	0.99
Rocket, 115mm, M55	VX	Comp B	M28	50.775	19,695	149.496	2.94	0.99
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None	50.775	19,695	149.496	2.94	0.99
Projectile, 155mm, M121A1	GB	None	None	50.775	19,695	149.496	2.94	0.99
Projectile, 155mm, M121	GB	None	None	50.775	19,695	149.496	2.94	0.99
Projectile, 155mm, M122	GB	None	None	50.775	19,695	149.496	2.94	0.99
Projectile, 8", M426	GB	None	None	50.775	19,695	149.496	2.94	0.99
Projectile, 155mm, M121A1	VX	None	None	50.775	19,695	149.496	2.94	0.99
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1	50.775	19,695	149.496	2.94	0.99
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None	23.908	41,827	64.232	2.69	0.99
Projectile, 155mm, M104	HD	Tetrytol	None	23.908	41,827	64.232	2.69	0.99
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None	50.775	19,695	149.496	2.94	0.99
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6	23.908	41,827	64.232	2.69	0.99
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	23.908	41,827	64.232	2.69	0.99

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: NO. 26 PIPING (PID)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	26.891	37,187	87.644	3.26	0.9
Tank, Spray, TMU-28/B	VX	None	None	26.891	37,187	87.644	3.26	0.9
Ton Container	GB	None	None	26.891	37,187	87.644	3.26	0.9
Ton Container	VX	None	None	26.891	37,187	87.644	3.26	0.9
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	9.577	104,412	27.121	2.83	0.10

SUPPLEMENTAL DATABUILDING BLOCK  
#26 PIPING (P)  
\_\_\_\_\_  
\_\_\_\_\_

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. REFERENCE ATTACHED DATE: \_\_\_\_\_  
LIST
- b. DOCUMENT NO. - DATE: \_\_\_\_\_
- c. OTHER DRAFT DEMIL PLAN FOR DATE: AUGUST 1975
- d. CAMDS VOLUMES 1 AND 2  
DISCUSSIONS WITH TEAD (CAPT. J. KING) 21, 22 OCTOBER 1975

2. NOTES \_\_\_\_\_  
\_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER -
- b. OTHER RADC-TR-74-268, FINAL REPORT OCTOBER 1974, "REVIS V C  
RADC NONELECTRONIC RELIABILITY NOTEBOOK" (RADC-TR-67-458)

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME SOUR  
(1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERATIONAL/TEST

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA REFERENCE NOTE
- b. TEAD/EA REFERENCE NOTE
- c. OTHER RADC-TDR-64-373, VOL II FINAL REPORT, DECEMBER 1964,  
"ANALYSIS OF MAINTENANCE TASK TIME DATA"

2. NOTES USEABLE DATA NOT YET AVAILABLE FROM THE TWO PRIME  
SOURCES: (1) CAMDS TESTING (2) ROCKY MOUNTAIN ARSENAL OPERAT  
-AL/TEST DATA.

## D. GENERAL REMARKS

FIRST SUBMITTAL DATE: 12-29-75

# BE#26 PIPING (PIP) REFERENCE DRAWING LIST

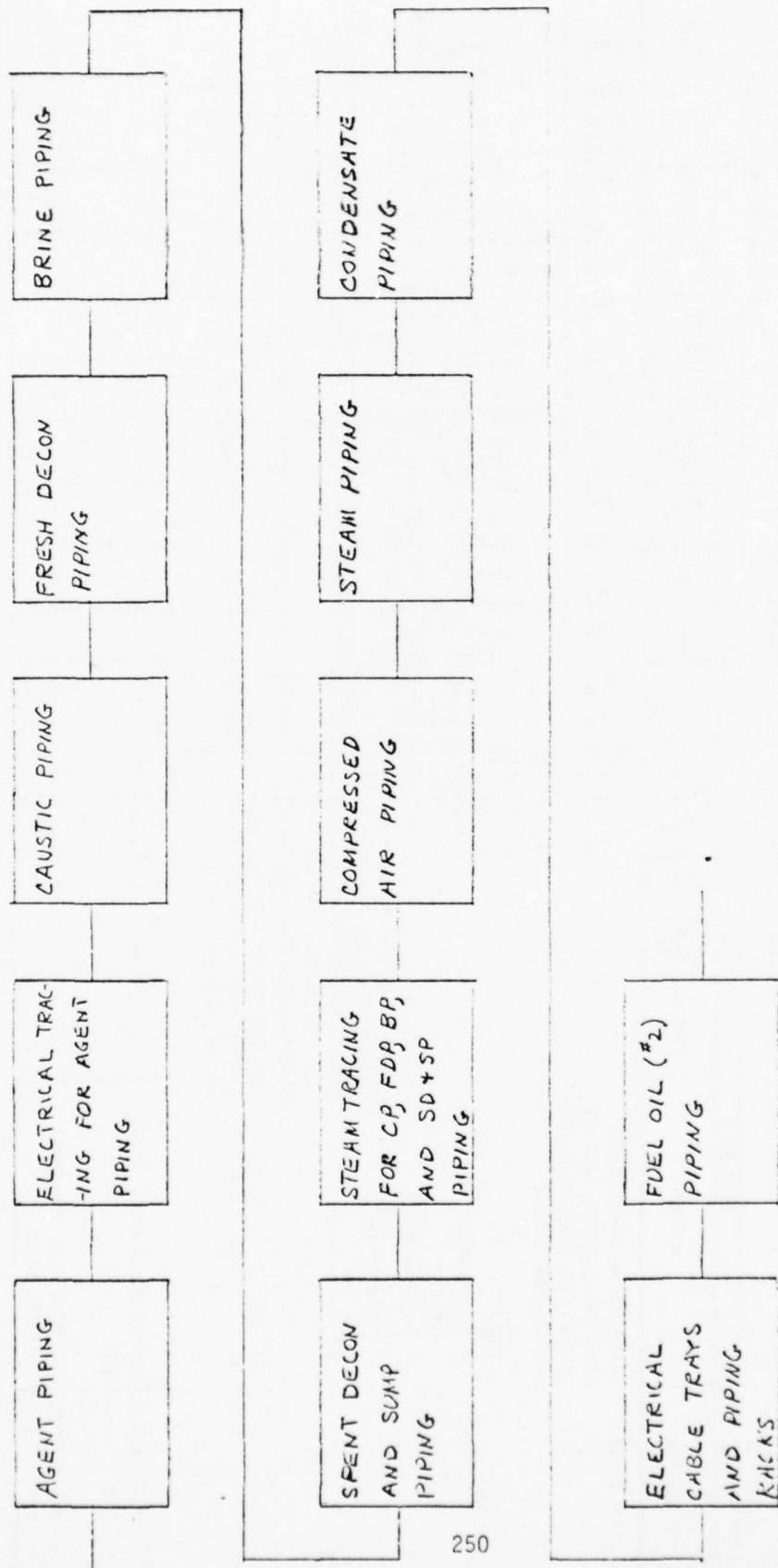
DRAWING NO.	REV.	SHEET	TITLE
TCDS 26-601-01	6/3/75	1	Mechanical Flow Diagram, Chemical Agent Piping
26-601-02	6/3/75	1	Mechanical Flow Diagram, Fresh Decon & Dilute Caustic Piping
26-601-03	6/3/75	1	Mechanical Flow Diagram, Spent Decon, Drains and Sump Piping
26-601-04	6/5/75	1	Mechanical Flow Diagram, Steam, Condensate, and Air Piping
26-603-01	6/24/75	1	Chemical Agent Munition Disposal System, Rack Piping Sht #1, Plan
26-603-02	6/23/75	1	Chemical Agent Munition Disposal System, Rack Piping Sht #2, Plan
26-603-03	6/27/75	1	Chemical Agent Munition Disposal System, Rack Piping Sht #3, Plan
26-604-01	6/16/75	1	Piping Section and Detail
26-604-02	7/14/75	1	Piping Section and Detail
26-604-03	8/12/75	1	Piping Section and Detail
26-604-05	8/21/75	1	Pipe Support Details
26-606-01	7/16/75	1	Rack Piping, Isometric - Agent
26-606-02	8/20/75	1	Rack Piping, Agent Shroud Plan and Elevation
26-606-03	9/26/75	1	Agent Valve Shroud, Detail and Section
26-607-01	7/29/75	1	Rack Piping, Isometric - Caustic
26-607-02	7/25/75	1	Rack Piping, Isometric Brine
26-608-01	8/1/75	1	Rack Piping, Isometric Fresh Decon
26-609-01	7/30/75	1	Rack Piping, Isometric Spent Decon and Sump Piping



BB #26 PIPING (PIP) REFERENCE DRAWING LIST (CON'T)

<u>DRAWING NO.</u>	<u>REV.</u>	<u>SHEET</u>	<u>TITLE</u>
26-610-01	7/28/75	1	Rack Piping, Isometric Compressed Air
26-611-01	7/21/75	1 of 2	Rack Piping, Isometric - Steam
26-611-01	9/15/75	2 of 2	Rack Piping, Isometric - Steam
TCDS 26-611-02	7/23/75	1	Rack Piping, Isometric Condensate
26-612-01	9/8/75	1	Underground Piping, Isometric #2 Fuel Oil
26-614-01	9/17/75	1	Chemical Agent Munition Disposal System, Electrical Tracing- Isometric Agent
26-614-02	9/14/75	1 of 4	Steam Tracing, Isometric Brine
26-614-02	7/30/75	2 of 4	Steam Tracing, Isometric Spent Decon & Sump Piping
26-614-02	8/1/75	3 of 4	Steam Tracing, Isometric Fresh Decon
26-614-02	10/2/75	4 of 4	Steam Tracing Parts List
26-616-01	8/12/75	1	Chemical Agent Munition Disposal System, Electrical Cable Tray Plan
26-616-02	8/24/75	1	Chemical Agent Munition Disposal System, Electrical Cable Tray Details

# BUILDING BLOCK NO. 26 PIPING (PIP) FLOW CHART



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 25, EHV-5 (ELE)

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS		
ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CODE (**) (X10 <sup>-6</sup> HR)	RATE (X10 <sup>-6</sup> HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)		NATH (X10 <sup>-6</sup> )	SOURCE (*)
AGENT PIPING	AGENT PIPING CARRIES AGENT FROM THE ECC, PPD, AND BIF TO THE ADS PER THE SKETCH AND MATRIX SHOWN.	-	-	1	601-01 603 604 606-01 02, 03 601-01 606-01 02	601-01	10.7	10.6	0.5	6.5	6.5	11.7	11.7	0.5	5.6	
<div><div><div>ECC</div><div>VALVE, BALL (MANUAL)</div><div>PPD</div><div>BIF</div><div>ADS</div></div><div>SEGMENT OF AGENT PIPING</div><div>2-ITEM USED VS. EXCLUSIONS</div><div>1. ECC TO ADS, PAST CLOSED VALVES TO PPD AND BIF LINE SEGMENTS</div><div>2. PPD TO ADS, PAST CLOSED VALVES TO ECC AND BIF LINE SEGMENTS</div><div>3. BIF TO ADS, PAST CLOSED VALVES TO PPD AND ECC LINE SEGMENTS</div></div>																
AGENT PIPING (SEGMENT 1)	CARRIES AGENT FROM ECC TO ADS	-	-	1	601-01	601-01	10.6	10.6	0.5	6.5	6.5	11.7	11.7	0.5	5.6	
AGENT PIPING (SEGMENT 2)	ECC/PPD AND BIF/PPD INTERFACE SEALS	-	-	2	606-01 1063 1064	606-01	10.7	10.7	0.5	6.5	6.5	11.7	11.7	0.5	5.6	

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 25 OFFICE (F16)

[illegible]

- Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

EQUIPMENT INFORMATION AND MAINTAINABILITY DATA

BUILDING BLOCK 10.24.71															
DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA						REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	HA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	MAINT. TIME (X10 <sup>-6</sup> )	SOURCE (*)	
NT PIPING (SEE SHEET 1) (CONT)															
INIT SWITCHES	INDICATE VALVE POSITION	-	-	3	604-01 0110	3	-	-	-	-	-	-	-	-	UNEXPECTED VALVE POSITION INDICATION EXCEEDED WOULD RESULT IN OVER-VALVE INSPECTION OF VALVE INDICATING TUBE POSITION, NOT LINE OUTDOWN.
HEAT PIPING (SEE SHEET 1) (CONT)	ENCLOSE AGENT PIPING AND VALVES IN A NO LEAKAGE SHELVD. ALSO, TO ALLOW AN ENCLOSED MEDIA TO SAMPLE THE ENVIRONMENT IMMEDIATELY ADJACENT TO THE AGENT PIPING TO DETECT ANY LEAKAGE IN THE PIPING. *NEGATIVE AIR PRESSURE	-	-	-	604-02 0201 TO 0205 606-03	3	-	-	-	-	-	-	-	-	SHOULD BE REPAIRING DURING SCHEDULED MAINT. EXCHANGE OR INSPECTION FOR OTHER UNSCHEDULED MAINTENANCE.
ELECTRICAL TRACING	HEAT SOURCE FOR PIPE/IMMED. STATE ENVIRONMENT TO PREVENT THE AGENT FROM FREEZING.	-	53345 34264	4 (THESE TO ATG, SLOW, AND LIGHT ETC)	614-01 0101 TO 0107	3	-	-	-	-	-	-	-	-	REPAIRS COULD BE MADE DURING SCHEDULED OPERATIONS.

$ENR = \frac{1}{ENR} = \frac{1}{\lambda} = \frac{1}{\lambda \times 10^{-6} / \text{HR}} = \frac{1}{\lambda} \times 10^6 \text{ HRS}$ 
 $ENR = \frac{1}{ENR} = \frac{1}{\lambda} = \frac{1}{\lambda \times 10^{-6} / \text{HR}} = \frac{1}{\lambda} \times 10^6 \text{ HRS}$ 
 $MTTR = \frac{1}{MTTR} = \frac{1}{\lambda} = \frac{1}{\lambda \times 10^{-6} / \text{HR}} = \frac{1}{\lambda} \times 10^6 \text{ HRS}$ 
 $MTBF = \frac{1}{MTBF} = \frac{1}{\lambda} = \frac{1}{\lambda \times 10^{-6} / \text{HR}} = \frac{1}{\lambda} \times 10^6 \text{ HRS}$ 
 $AVAILABILITY = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$

\*Information is detailed in Supplemental Data Sheet  
 \*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period  
 4 - See Supplemental Data Sheet



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 24, FILING (1)

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	NEG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME TH (X10 <sup>-6</sup> )	NA TH	SOURCE (*)	
SENT PIPING (SEG-ENT 1) (CONT)																
FE HANGER ASS. CABLES	HOLD AGENT PIPING AND CROCOD	-	-	AS REQ	606-02 0246	3	NEG	-	-	-	-	-	-	-	-	MULTIPLE FAILURES WERE RE ASSIGNED TO CROCOD FAILURE CODES, TGA A.
ELECTRICAL CABLE	HOLD ELECT. CABLES	-	-	AS REQ	616-01 Unit To 0246	3	NEG	-	-	-	-	-	-	-	-	PER ABOVE
STEEL RACK	HOLD PIPING	-	-	AS REQ	603-01 -03 604-01 -04	3	NEG	-	-	-	-	-	-	-	-	PER ABOVE
FLAT PIPING (SEG-ENT 2)	CARRIES AGENT FROM PPD TO MDS.	-	-	1	601-01											ALL 12.X SUBENTRIES ARE IDENTICAL OR DIRECTLY EQUIVALENT TO THE 11.X SUBENTRIES.
SENT PIPING (SEG-ENT 3)	CARRIES AGENT FROM EIF TO MDS.	-	-	1	604-01											ALL 13.X SUBENTRIES ARE IDENTICAL OR DIRECTLY EQUIVALENT TO THE 11.X SUBENTRIES.

SUBCALCULATION FOR AGENT PIPING (SEGMENTS) NA =  $\frac{1}{\text{INATM}} \times 10^{-6}$

INFORMATION IS DETAILED IN SUPPLEMENTAL DATA SHEET 1, 2, OR 3. MAINTENANCE APPLICABILITY PER ENTRY 26-10.

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

MTBF =  $\frac{1}{\text{MTTR}}$

MTTR =  $\frac{1}{\text{MTBF}}$

AVAILABILITY =  $\frac{1}{1 + \text{MTTR} \times 100\%}$

SEE SHEET NO. 18 FOR  
FINNL CALCULATIONS.

COND 1 100%

COND 2 7.804

COND 3 7.804

COND 4 7.804

INATM =  $\frac{1}{\text{ENATM}}$

ENATM =  $\frac{1}{\text{INATM}}$

COND 1 7.804

COND 2 7.804

COND 3 7.804

COND 4 7.804

COND 1 7.804

COND 2 7.804

COND 3 7.804

COND 4 7.804

COND 1 7.804

COND 2 7.804

COND 3 7.804

COND 4 7.804

## EQUIPMENT INFORMATION AND FAILURE MAINTAINABILITY DATA

BUILDING BLOCK NO. 26 PIPING (SIP)

ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
					INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE A (X10 <sup>-6</sup> /HR)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (X10 <sup>-6</sup> )	NA TM SOURCE (*)

BUILDING BLOCK NO. 26 PIPING (SIP)  
 THIS PIPING CARRIES ALL LIQUID  
 AGENT, STEAM, CONDENSATE, AIR, WATER, AND  
 FUEL OIL BETWEEN THE  
 BUILDING BLOCKS DURING DE-  
 NIT OPERATIONS.

## 1. ANALYSIS:

INFORMATION OF THE PIPING SEGMENTS FOR THESE PIPING SUBSYSTEMS AND THE EIGHT PROCESS FLOW DIAGRAMS INDICATES THAT SUFFICIENT INFORMATION  
 WAS NOT AVAILABLE TO CONSTRUCT A PIPING SEGMENT UTILIZATION VS. MAINTENANCE TIME MATRIX AS WAS DONE FOR THE AGENT PIPING. THIS A  
 MAINTENANCE TIME SENSITIVE RELIABILITY/MAINTAINABILITY ANALYSIS CANNOT BE ACCOMPLISHED. HOWEVER, USING CERTAIN CONSERVATIVE  
 ASSUMPTIONS, A GENERAL MAINTENANCE TIME AVAILABILITY VALUE CAN BE OBTAINED THAT WILL ESTABLISH A REALISTIC LOWER LIMIT AVAILABILITY.

ASSUMPTIONS (ALL OF THESE ASSUMPTIONS ARE CONSERVATIVE):

- M3 ROCKET, GEXX
- PROJECTILES/CARTRIDGES, GEXX WITHOUT BURSTERS
- PROJECTILES/CARTRIDGES, GEXX WITH BURSTERS
- M23 MINE, VX

OPERATIONS INVOLVING THE FOLLOWING MAINTENANCE PROCESS FLOWS UTILIZE 25% OF THE TOTAL PIPING DISCUSSED UNDER THIS ITEM NUMBER.

- PROJECTILES, MUSTARD WITH BURSTERS
- 42" MORTAR, MUSTARD
- 42" MORTAR, GEXX

OPERATIONS INVOLVING THE FOLLOWING MAINTENANCE PROCESS FLOWS UTILIZE 10% OF THE TOTAL PIPING DISCUSSED UNDER THIS ITEM NUMBER.

- TEN CONTAINER, MUSTARD

IN ALL BUT OBVIOUS INSTANCES, A FAILURE CONSEQUENCE OF 2 RATHER THAN 3 IS ASSUMED.

AS A GENERAL CONSERVATIVE TOTAL FAILURE RATE IS ASSUMED FOR ALL FAILURE CONSEQUENCES OF 2.

Information is detailed in Supplemental Data Sheet  
 Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period

$$\begin{aligned}
 \text{MTBF} &= \frac{1}{\text{FNA}} = \frac{1}{\text{FNA}} \times 10^{-6} \text{ HRS} \\
 \text{MTR} &= \frac{\text{FNA}}{\text{FNA}} = \frac{\text{FNA}}{\text{FNA}} \times 10^{-6} \text{ HRS} \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTR}} \times 100\% = \frac{1}{1 + \text{MTR}} \times 100\% \times 10^{-6}
 \end{aligned}$$

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME TH (HR)		NA TH ( $\times 10^{-6}$ )	SOURCE (*)
CAUSTIC PIPING	THIS PIPING CARRIES ALL CAUSTIC BETWEEN THE BUILDING BLOCKS DURING DEAIL OPERATIONS.	-	-	1	607-01											
CAUSTIC (INC FLANGE, BOLTS AND NUTS)	PIPING/EB, PIPING/VALVE, AND PIPING FLIND FLANGE INTERFACES	-	-	12	0115, 0116, 0124	2	1.433	P22	17.196	-	-	-	2.5	42.596	P22, P23, 0124, 0125, 0126, 0127, 0128, 0129, 0130, 0131, 0132, 0133, 0134	CAUSTIC AND ACETIC ACID PIPING/VALVE
CAUSTIC (INC FLANGE, BOLTS AND NUTS)	CARRIES CAUSTIC	-	-	1	0115, 0116, 0124	2	0.0007	P20	0.014	-	-	-	2.0	0.1418	EST	NA TH EST: MIN 1.418
CAUSTIC VALVES	FLOW CONTROL	VEF-015C (CAUSTIC)	-	3	0118, 0119	2	0.215	P41	0.430	-	-	-	3.3	1.419	P41, P42, 0118, 0119, 0120, 0121, 0122, 0123, 0124, 0125, 0126, 0127, 0128, 0129, 0130, 0131, 0132, 0133, 0134	CAUSTIC AND ACETIC ACID PIPING/VALVE

\*Information is detailed in Supplemental Data Sheet

Future Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 26 PIPING (F.E.)

DESCRIPTION			FAILURE DATA					MAINTAINABILITY DATA					REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	INATM (X10 <sup>-6</sup> )
FRESH DECON PIPING	THIS PIPING CARRIES ALL FRESH DECON BETWEEN THE BUILDING BLOCKS DURING ISHL OPERATIONS	-	-	1	603-01										
INLET (INC FLANGES, ELBOWS, AND JOINTS)	PIPING/PIPING INTERFACE	-	94717	1	0118	2	1.433	P22	1.433	-	-	-	2.5	3.585	INATM 1.433, 32 HRS/JOINT = 32.5 HRS -34
PIPE (INC JOINTS)	CARRIES FRESH DECON	-	-	15,000 (25,000 JOINTS)	0114	2	3.0170	EST	0.170	-	-	-	2.0	0.340	EST 32 HRS/JOINT = 32.5 HRS
PLUG VALVES	FLOW CONTROL	VFF-015V (CAMDS TAG)	94717	4	0115	2	0.215	P41	1800	-	-	-	3.3	2.822	INATM 1.433, 32 HRS/JOINT = 32.5 HRS 2.54255

$$ENA = \frac{1}{MTBF} \times 10^{-6} / \text{HR}$$

$$INATM = \frac{1}{MTTR} \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{ENA} \times 10^6 \text{ HRS}$$

$$MTTR = \frac{1}{INATM} \times 10^6 \text{ HRS}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

EQUIPMENT INFORMATION AND MAINTAINABILITY DATA

BUILDING BLOCK NO. 24 PIPING FIELD

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGR. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	HAZ TM (X10 <sup>-6</sup> )	
ENGINE PIPING	THIS PIPING CARRIES ALL EXHAUST BETWEEN THE BUILDING BLOCKS DURING DENIL OPERATIONS	-	-	1	607-02									
EXHAUST LINE FLANGE (BETWEEN AND WELDS)	PIPING/BLOCK AND PIPING/VALVE INTERFACE	-	-	8	0214, 0215	2	1.433	P22	11.464	-	-	-	2.5	23.660 0214, 0215, 0216, 0217, 0218, 0219, 0220, 0221, 0222, 0223, 0224
PIPE (1/2" JOINTS AND WELDS)	CARRIES EXHAUST	-	-	AS REQ (200 WELDS JOINTS)	0201, 0207	2	0.0017	P20	0.051	-	-	-	2.0	0.102 EST 0201, 0207, 0208, 0209, 0210, 0211, 0212, 0213, 0214, 0215, 0216, 0217, 0218, 0219, 0220, 0221, 0222, 0223, 0224
DIAPHRAGM VALVES	FLOW CONTROL	VDF-015E (CANDS TAG)	-	3	0216, 0217	2	0.215	P41	0.430	-	-	-	3.3	1.413 0216, 0217, 0218, 0219, 0220, 0221, 0222, 0223, 0224

INA =  $\frac{1}{MTBF} \times 10^{-6}$  / HR

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

MTBF =  $\frac{1}{INA}$  =  $\frac{1}{\frac{1}{MTBF} \times 10^{-6}}$  =  $\frac{1}{INA} \times 10^6$  HRS

AVAILABILITY =  $\frac{MTBF}{MTBF + MTTR} \times 100\%$

ENATM =  $\frac{ENATM}{ENA}$  =  $\frac{ENATM}{ENA} \times 10^{-6}$  HRS



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK 12.24 PIPING (C12)

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK OUT TIME (HR)	TOTAL TIME TH (HR)		N.A.T.M. (X10 <sup>-6</sup> )	SOURCE (*)
PIPE DECON AND PIPING	THIS PIPING CARRIES ALL SPENT DECON BETWEEN THE BUILDING BLOCKS DURING DEMIL OPERATIONS.	-	-	1	009-01											
ADJ. (NG FLANGE) PIPING/PIPING INTERFACE (1- AND 2-MS)		-	36717	1	0110, 0117, 0118	2	1.433	P22	1.433	-	-	-	2.5	3.5855	009-01, 0117, 0118	REMOVE AND REPLACE 02 HOURS/PIPING 3.5855
BE LINE JOINTS)	CARRIES SPENT DECON	-	-	MC 842 (2115 2116 2117 2118 2119 2120)	0101-0102, 0103, 0104, 0105, 0106, 0107, 0108, 0109, 0110, 0111, 0112	2	0.0170	EST	1.955	-	-	-	2.0	3.910	EST	TEST FOR WELD JOINTS CAN TO EST: 1.955 HOURS
FLOW VALVE	FLOW CONTROL	-	-	9	0113, 0114	2	0.215	P41	1.935	-	-	-	3.3	6.3855	009-01, 0113, 0114	REMOVE AND REPLACE 02.5 HOURS/PIPING 6.3855

$$ENA = \frac{1}{\lambda} \times 10^{-6} / HR \quad ENA = \frac{1}{\lambda} \times 10^{-6}$$

$$MTTR = \frac{1}{\lambda} \times 10^{-6} / HR \quad MTTR = \frac{1}{\lambda} \times 10^{-6}$$

$$MTBF = \frac{1}{\lambda} \times 10^{-6} / HR \quad MTBF = \frac{1}{\lambda} \times 10^{-6}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\% \quad AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 24 PIPING (BIB)

DESCRIPTION		PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
ITEM NAME	FUNCTION					FAIL CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	
STEAM, CONDENSED- STEAM, AND AIR STEAM (EXCEPT TRACING STEAM), CONDENSATE, AND AIR BETWEEN THE BUILDING BLOCKS DURING DEMIL OPERATIONS.		-	-	1	601-04								
					603								
					604								
					610-01								
					611-01								
					611-02								

RESULTS OF ANALYSIS:

EXAMINATION OF THE PIPING SEGMENTS FOR THESE PIPING SUBSYSTEMS AND THE EIGHT PROCESS FLOW DIAGRAMS INDICATES THAT SENSITIVE INFORMATION IS NOT YET AVAILABLE TO CONSTRUCT A PIPING SEGMENT UTILIZATION VS. MAINTENANCE LINE MATRIX AS WAS DONE FOR THE ASSET IN THE PAST. THIS A MAINTENANCE LINE SENSITIVE RELIABILITY/MAINTAINABILITY ANALYSIS CANNOT BE ACCOMPLISHED. HOWEVER, USING A GENERAL CONSERVATIVE ASSUMPTIONS, A GENERAL MAINTENANCE LINE AVAILABILITY VALUE CAN BE OBTAINED THAT WILL ESTABLISH A REALISTIC LINE AVAILABILITY.

ASSUMPTIONS (ALL OF THESE ASSUMPTIONS ARE CONSERVATIVE):

(1) OPERATIONS INVOLVING THE FOLLOWING MUNITION PROCESS FLOWS UTILIZE 50% OF THE TOTAL PIPING DISCUSSED UNDER THIS ITEM NUMBER.

- M55 MORTAR, 60/XX
- PROJECTILES/CARTRIDGES, 60/XX WITHOUT BURSTERS
- PROJECTILES/CARTRIDGES, 60/XX WITH BURSTERS
- M55 MINE, VX
- OPERATIONS INVOLVING THE FOLLOWING MUNITION PROCESS FLOWS UTILIZE 25% OF THE TOTAL PIPING DISCUSSED UNDER THIS ITEM NUMBER.
- PROJECTILES, MUSTARD WITH BURSTERS
- 4.2" MORTAR, MUSTARD
- 60/XX ITEMS, 60/XX

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$\begin{aligned}
 \text{MTBF} &= \frac{1}{\text{ENR}} = \frac{1}{\text{HRS}} & \text{ENR} &= \text{---} \times 10^{-6} / \text{HR} & \text{ENR} &= \text{---} \times 10^{-6} \\
 \text{MTTR} &= \frac{\text{ENR}}{\text{ENR}} = \text{---} \text{HRS} & \text{MTTR} &= \frac{\text{ENR}}{\text{ENR}} = \text{---} \text{HRS} \\
 \text{AVAILABILITY} &= \frac{1}{1 + \text{MTTR} \times 100\%} = \text{---}
 \end{aligned}$$

[illegible]

TEMP, CONDENSED, AND AIR  
WINDING (CONT)

### ASSUMPTIONS (CONT)

(3) OPERATIONS INVOLVING THE FOLLOWING MUNITION PROCESS FLOWS UTILIZE 10% OF THE TOTAL PIPING DISCUSSED UNDER THIS ITEM NUMBER.

1 - TON CONTAINER, MUSTARD

(c) IN ALL BUT OBVIOUS INSTANCES, A FAILURE CONSEQUENCE OF 2 RATHER THAN 3 IS ASSUMED.

(5) A GIVEN COMPONENTS TOTAL FAILURE RATE IS ASSUMED FOR ALL FAILURE CONSEQUENCES OF R.

\*Information is detailed in Supplemental Data Sheet

ENL = \_\_\_\_\_ x 10<sup>-6</sup>/HR ENATM = \_\_\_\_\_ x 10<sup>-6</sup>

MTBF =  $\frac{1}{\text{ENL}}$  = \_\_\_\_\_ HRS MTR =  $\frac{\text{ENATM}}{\text{ENL}}$  = \_\_\_\_\_

AVAILABILITY =  $\frac{\text{MTR}}{1 + \text{MTBF}}$  x 100% = \_\_\_\_\_ %

\*\*\*Failure Consequence Code

1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure  
 3 - Minor Failure - Repair During Maintenance Period

•Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Repair During  
4 - See Supplemental Data Sheet

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK NO. 26 PIPING (F10)									
DESCRIPTION			FAILURE DATA			MAINTAINABILITY DATA			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	DATE X 10 <sup>-6</sup> (HRS)	SOURCE (*)	NA
COMPRESSED AIR PIPING	THIS PIPING CARRIES ALL COMPRESSED AIR BETWEEN THE BUILDING BLOCKS DURING DEMIL OPERATIONS.	-	-	1	0100, 0141, 0142	2	1.433	P22	7.165
PIPE (INC FLANGE, ELBOWS, AND NUTS)	PIPING/EB INTERFACES	-	-	5	0100, 0141, 0142	2	0.0017	P20	0.1015
PIPE (INC JOINTS OR MECHANICAL FITTINGS OR WELDS)	CARRIES COMPRESSED AIR SUPPLY	-	-	8	0101-0135	2	0.215	P41	1.720
WATER VALVES	FLOW CONTROL	VGT-015A (CAMPS TAG)	-	8	0143, 0144	2	0.215	P41	1.720

$$ENR = \frac{1}{ENR} = \frac{1}{ENR} \times 10^{-6} / \text{HRS}$$

$$MTBF = \frac{1}{ENR} = \frac{1}{ENR} \times 10^{-6} / \text{HRS}$$

$$MTTR = \frac{ENR}{ENR} = \frac{ENR}{ENR} \times 10^{-6} / \text{HRS}$$

$$AVAILABILITY = \frac{MTBF}{MTBF + MTTR} \times 100\% = \frac{MTBF}{MTBF + MTTR} \times 100\%$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet





DESCRIPTION										FAILURE DATA				MAINTAINABILITY DATA					
ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (+)	FAIL CONSEQ. (**)	DATE A (X10 <sup>-6</sup> HR)	SOURCE (+)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NA TH (X10 <sup>-6</sup> )	SOURCE (+)	REMARKS		
221	CONDENSATE PIPING	THIS PIPING CARRIES ALL CONDENSATE BETWEEN BUILDING BLOCKS DURING DEMIL OPERATIONS (MEDIUM PRESSURE CONDENSATE FROM ADS TO THE UTILITY BUILDING, LOW PRESSURE CONDENSATE FROM ALL ADS EXCEPT ADS TO THE UTILITY BUILDING.	-	-	1	44-01													
222	CONDENSATE PIPING (INC FLANGES, ELBOWS, AND JOINTS)	PIPING/ELB INTERFACE JOINTS	-	-	9	0220-0222	2	1/4/33	P22	12877	-	-	2.5	22240	01811	CONDENSATE ADS TO UTILITY BUILDING			
223	PIPE (AL JOINTS) WITH MECHANICAL FITTINGS OR WELDS	CARRIES CONDENSATE TO UTILITY BUILDING	-	-	AS REQ (FOR MECHANICAL JOINTS, 2// WELD JOINTS)	0201-0218	2	0.0017	P20	0.1862	-	-	2.0	22240	217	AL (MECHANICAL JOINTS) CONDENSATE ADS TO UTILITY BUILDING			
224	ISOLATE VALVES	FLOW CONTROL	WGS-060B (CAMPS TAG)	-	11	0233-0234	2	0.215	P41	2.365	-	-	3.2	22245	01816	REMOVE AND REINSTALL AT CAMP TAG			

SUBCALCULATION FOR STEAM, CONDENSATE, AND AIR PIPING:

Information is detailed in Supplemental Data Sheet

Future Consequence Code

1 - Catastrophic Failure

$$\begin{aligned} N\lambda_{TA} &= 0 \\ N\lambda_c &= \sum N\lambda = 58.1062 \\ N\lambda_{TM} &= 0 \end{aligned}$$

\_\_\_\_\_ HRS

MTT8 •  $\frac{\Sigma \Delta \Delta T M}{\Sigma \Delta \Delta T M}$

has



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION		FAILURE DATA				MAINTAINABILITY DATA				REMARKS
ITEM NAME	FUNCTION	PART NO.	MEG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}$ /HR)	SOURCE (*)	NA	
								CHECK-OUT TIME (HR)	REPAIR TIME (HR)	
								TOTAL TIME (HR)	TIME (HR)	
FUEL OIL (#2) PIPING	THIS UNDERGROUND PIPING CARRIES ALL #2 FUEL OIL BETWEEN THE SUPPLY TANK AND THE BUILDING BLOCKS DURING DEMIL OPERATIONS.	-	-	1	012-01					
PIPE (WELD JOINTS AND WELDS)	CARRIES #2 FUEL OIL SUPPLY	-	-	AS REQ (2 IN WELD JOINTS)	0101 - 0104	2	0.00077	P20	0.0238	EST
								100	2.380	EST
										REMOVE AND REPLACE: SINCE THE PIPING IS UNDERGROUND A LEAK WOULD BE DIFFICULT TO FIND AND WOULD REQUIRE A GOOD DEAL OF TIME AND EFFORT TO REPAIR.

SUBCALCULATION FOR FUEL OIL PIPING:

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

$$MTBF = \frac{1}{\lambda} = \frac{1}{0.00077} = 1298.7 \text{ HRS}$$

$$ENR = \frac{1}{\lambda} \times 10^{-6} = 1298.7 \times 10^{-6}$$

$$MTTR = \frac{REPAIR TIME}{TOTAL TIME} = \frac{2.380}{100} = 0.0238$$

$$ENR = \frac{ENR}{1 + MTTR} = \frac{1298.7 \times 10^{-6}}{1 + 0.0238} = 1270.0 \times 10^{-6}$$

$$N_{CATA} = 0$$

$$N_{PROD} = \sum N_{CATA} = 0.0238$$

$$N_{CATA} = 0$$

$$N_{CATA} = \sum N_{CATA} = 2.380$$

$$COND 1, 2, 3, 4 = N/A$$

$$COND B, C = N/A$$

SEE SHEET NO. 18 FOR FINAL CALCULATIONS.

A CYCLE ITEM

ITEM NO.	ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
					INFO. SOURCE (1)	FAIL SOURCE (2)	DATE (3)	NA SOURCE (4)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL TIME (HR)	
GENERAL CALCULATIONS FOR BS-24 (TYPING) AVAILABILITY.													
REFERENCE ON CALCULATION PAGES FOR INPUT NUMBERS:													
PAGE 4 - AGENT PIPING													
PAGE 10 - FRESH DECON, DILUTE CAUSTIC, SPENT DECON, DRAINING, AND SUMP PIPING													
PAGE 15 - STEAM, CONDENSATE, AND AIR PIPING													
PAGE 16 - ELECTRICAL CABLE TRAYS AND PIPING RACKS.													
PAGE 17 - FUEL OIL PIPING													

AGENT PIPING		FRESH DECON, DILUTE CAUSTIC, SPENT DECON, DRAINING, AND SUMP PIPING		STEAM, CONDENSATE, AND AIR PIPING		ELECTRICAL CABLE TRAYS AND PIPING RACKS		FUEL OIL PIPING	
N/A	S/N	N/A	S/N	N/A	S/N	N/A	S/N	N/A	S/N
2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
N/A	N/A	0.9571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
N/A	N/A	9.5571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
2.983	23412	9.5571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
N/A	N/A	2.7142	9.5571	5.9108	15.2037	NEG	N/A	0.0238	2.283

NISS ROCKET, GUN	2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
PROJECTILES/CARTRIDGES, GUN W/ BUSTERS	2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
PROJECTILES/CARTRIDGES, GUN W/ BUSTERS	2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
PROJECTILES, N/A. TAKEN WITH BUSTERS	2.983	23412	18.7142	471857	29.0541	76.0185	NEG	N/A	0.0238	2.283
N/A, N/A, N/A	N/A	N/A	9.5571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
42" MORTAR, MUSTARD	2.983	23412	9.5571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
BULK ITEMS, GUN	2.983	23412	9.5571	238418	14.5271	38.0092	NEG	N/A	0.0238	2.283
TON CONTAINMENT, MUSTARD	N/A	N/A	2.7142	9.5571	5.9108	15.2037	NEG	N/A	0.0238	2.283

268

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

### 7 - Catastrophic Failure



FAILURE RATE FACTORS:

HIGH CYCLIC APPLICATION FACTOR:

	<u>MUNITION PROCESSING RATE (DA)</u>	<u>MUNITION PROCESSING RATE (HR)</u>	<u>FAILURE RATE FACTOR</u>
CONDITION A (BASE)	N/A	N/A	1 (BASE)
CONDITION 1	400	20	2
CONDITION 2	650	32.5	3.25
CONDITION 3	800	40	4
CONDITION 4	1000	50	5

MAINTAINABILITY FACTORS:

MAINTAINABILITY FACTOR (SUIT REQUIREMENT):

<u>SUIT REQUIREMENT</u>	<u>CONDITION B FACTOR</u>
STREET	1
GLOVES	1.5
MASK AND GLOVES	2
PRESSURIZED SUIT	3

MAINTAINABILITY FACTOR (ACCESSIBILITY/SPACE LIMITATIONS)

<u>ACCESSIBILITY/SPACE LIMITATION</u>	<u>CONDITION C FACTOR</u>
NO LIMITATION	1
LIMITATION	1.33

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #27 ELECTRICAL (ELE)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	509.916	1961.1	1031.496	2.02	.99
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	7	7	7	7	

\*MUNITION DEMILITARIZATION PROCESS FLOW

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #27 ELECTRICAL (ELE)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS,GB/VX								
Bomb,750#,MC-1	GB	None	None	509.914	1961.1	1031.496	2.02	.7
Tank,Spray, TMU-28/B	VX	None	None					
Ton Container	GB	None	None					
Tone Container	VX	None	None					
*TON CONTAINER,MUSTARD								
Ton Container	HD	None	None	7	7	7	7	7

SUPPLEMENTAL DATA

BUILDING B

# 27 E-2811/17/75

## A. DESCRIPTION

## 1. SOURCE

a. DRAWING NO. See Appendix list DATE: \_\_\_\_\_

b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_

c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES \_\_\_\_\_

## B. FAILURE DATA

## 1. SOURCE

a. CUSTOMER \_\_\_\_\_

b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

a. RMA \_\_\_\_\_

b. TEAD/EA \_\_\_\_\_

c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

D. GENERAL REMARKS *The emergency generating systems and oil  
hydraulic systems are not included in this analysis.  
Analysis of cyclic loads (water starting) may be required  
for oil in total system availability.*

BE 27 666

217  
11/17/75  
Rev

Drawings:

21-500-01	24 MAY 75
02	24 MAY 75
03	22 MAY 75
04	
05	
06	
07	
08	
09	
10	
11	9 JUN 75
12	20 MAY 75
13	20 MAY 75
14	24 MAY 75
15	7 JUN 75
16	24 MAY 75
17	24 MAY 75
18	15 AUG 75
19	15 AUG 75
20	15 AUG 75

27-501-01	7 JUN 75		
02	30 APR 75		
03	3 APR 75		
04	23 FEB 75		
05	28 FEB 75		
06	9 JUN 75		
07	9 JUN 75		
08	19 NOV 74	REV	1
09	24 FEB 75	REV	5
10	24 FEB 75	REV	2
11	26 FEB 75	REV	2
12	9 JUN 75		
13	17 DEC 74	REV	1
14	16 DEC 74	REV	3
15	15 DEC 74	REV	4
16	5 JAN 74	REV	1



1773

20



0

BB # 27 ELE

117  
117  
117

FANURE LINES

CONTROL TRANSFORMER

MIL STD 217A p 7.7-11 0-60°C ( $.5 \times 10^{-6}$ )

FUSE

MIL STD 217A p 7.12-3 ( $.1 \times 10^{-6}$ )

BUILDING BLOCK: #27 ELECTRICAL (ELE)  
FLOW CHART



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #27 ELECTRICAL (ELE)

ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAILURE DATA			MAINTAINABILITY DATA				REMARKS
						FAIL. CONSO. (**)	RATE $\lambda$ $\times 10^{-6}/HR$	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME $\times 10^{-6}$ (HR)	
120/200V Break	DISTRIBUTION PANEL			1	(500)	2	.082	p19	.5	4.0	.5	5.0	CB 3P Gnd
MAIN BUS 2000A	MAIN Protection			7		2	.082	p19	.5	1.5	.5	2.5	CB 3P Gnd
FOR BUS 2100A	FEEDER PROTECTION			1		2	.082	p19	.5	1.0	.5	2.0	CB 3P Gnd
FOR BUS 500A	FEEDER PROTECTION			1		2	.082	p19	.5	1.0	.5	2.0	CB 3P Gnd
FOR TERM SW	TRANSFER TO EMERG. GENERATOR			1		2	.1013	p33	.5	4.0	.5	5.0	Relay Contactor Gnd
DIFFER. HORN NC				1	(500)	2	.166	p33	.5	1.0	.5	2.0	Relay Gnd Gnd
22 220V BATT	REGENERATOR TO NORMAL 21			1	(500)	2	.1446	p34	.5	1.0	.5	2.0	
22 220V BATT	NORMAL TO EMERGENCY			1		2	.1446	p34	.5	1.0	.5	2.0	
	MCC A - DEAC FURNACE												
	- PANEAS A1, A4, A6												
	* CUMMINS 1000KVA												
	* DEAC FURNACE												
	* DUNNAGE Saw Bldg												
WIRE STARTERS		14001200A		7	(500)	2	.1013	p33	.5	1.0	.5	2.0	Relay Contactor Gnd
WIRE STARTERS		14001200A- A 01A		1	(500)	2	.1013	p33	.5	1.0	.5	2.0	Relay Contactor Gnd

$$INA = 1/5403 \times 10^{-6}/HR \quad ENIM = 44742 \times 10^{-6}$$

\* Information is detailed in Supplemental Data Sheet

\*\* Failure Sequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Backup System Not Involved

$$MTBF = \frac{1}{INA} = \frac{1}{1/5403 \times 10^{-6}/HR} = 5403 \times 10^6 \text{ HRS}$$

$$MTR = \frac{ENIM}{INA} = \frac{44742 \times 10^{-6}}{1/5403 \times 10^{-6}/HR} = 241,000 \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + \frac{MTR}{MTBF}} \times 100\% = \frac{1}{1 + \frac{241,000}{5403 \times 10^6}} \times 100\% = 99.99\%$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE A (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)		NATH (X10 <sup>-6</sup> )	SOURCE (*)
CONTACTORS	ARC-A (CONTINUOUS)	400A100A		2	06	2	1.015	P33	2.011	.5	1.0	.5	2.0	4.052	P33	Relay Contactor Good
	RESISTANCE HEATERS	400A100A		1	06	2	1.015	P33	1.013	.5	1.0	.5	2.0	2.024	P33	Relay Contactor Good
SWITCH	LIGHTING	ATX		1	06	2	.518	P37	.515	.5	1.0	.5	2.0	1.136	P37	Toggle Good
CIRCUIT BREAKERS	≤ 100A			20	06	2	.692	P19	11.84	.5	1.0	.5	2.0	27.48	P19	CB 3P Good
CIRCUIT BREAKERS	> 100A			1	06	2	.692	P19	.692	.5	1.5	.5	2.5	1.73	EST	CB 3P Good
REL TRANSFORMER				12	06	2	.3	X	5.6	.5	1.0	.5	2.0	7.2	EST	
	e. BUS			12	06	2	.1	X	1.2	.5	1.0	.5	2.0	2.4	EST	
OVERLOAD HTR				6	06	2	.692	P19	4.152	.5	1.0	.5	2.0	8.704	P19	CB 3P Good

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

MTBF =  $\frac{1}{\text{ENR}}$  =  $\frac{1}{2.7091 \times 10^{-6}}$  HRS

MTR =  $\frac{\text{ENR}}{\text{ENR}}$  =  $\frac{1}{2.7091 \times 10^{-6}}$  HRS

AVAILABILITY =  $1 - \frac{\text{MTR}}{\text{MTBF}} \times 100\%$  =  $1 - \frac{1}{2.7091 \times 10^{-6}} \times 100\%$  =  $1 - 3.7091 \times 10^{-6}$



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #27 ELECTRICAL (ELE)

DESCRIPTION			FAILURE DATA			MAINTAINABILITY DATA						REMARKS				
ITEM NAME	FUNCTION	PART NO.	MFG. CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL TIME (HR)	NATH ( $\times 10^{-6}$ )	SOURCE (*)
MOTOR STARTERS	MCC B IN Utility Module Panel B1 AIR COMP, MVD Pump, Compressor, RDM Saws			17	07	2	1.013	P33	17.221	.5	1.0	.5	2.0	344/2	P33	Relay Contactor Good
CONTACTORS	RESISTANCE HEATING			1	07	2	1.013	P33	1.011	.5	1.0	.5	2.0	2.026	P33	Relay Contactor Good
CONTACTORS	LIGHTING			1	07	2	1.013	P33	1.015	.5	1.0	.5	2.0	2.026	P33	Relay Contactor Good
279 CONTROL TRANSFORMER	LIGHTING			1	07	2	1.528	P37	1.528	.5	1.0	.5	2.0	1.176	P37	Toggle Good
CIRCUIT BREAKS	$\leq 100 \text{ A}$			19	07	2	.3	*	5.7	.5	1.0	.5	2.0	11.4	EST	
CIRCUIT BREAKS	$> 100 \text{ A}$			20	07	2	.692	P19	13.84	.5	1.0	.5	2.0	2760	P19	CBS 3P Good
OVERLOAD HITS				2	07	2	.692	P19	1.304	.5	1.5	.5	2.5	3.46	EST	CBS 3P Good
FUSE BUS				45	07	2	.692	P19	31.14	.5	1.0	.5	2.0	62.28	EST	CBS 3P Good
				19	07	2	.1	*	1.9	.5	1.0	.5	2.0	3.8	EST	

$$FNA = \frac{1}{27.77} \times 10^{-6} / \text{HR}$$

$$ENATM = \frac{1}{142.24} \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure sequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure

$$MTBF = \frac{1}{FNA} = \frac{1}{27.77} \times 10^6 \text{ HRS}$$

$$MTR = \frac{ENATM}{FNA} = \frac{1}{142.24} \times 10^6 \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + MTR} \times 100\% = \frac{1}{1 + \frac{1}{142.24} \times 10^6} \times 100\%$$

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #27 ELECTRICAL (ELE)

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA						REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (H)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda \times 10^{-6}/HR$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-TOTAL TIME (HR)	NA TM (X10 <sup>-6</sup> )		SOURCE (*)	
MCC-C IN PDF Bldg																
Circuit Breaker	PANABREAKER C1,C2, C3			26	08 (501)	2	.692	p19	17992	.5	1.0	.5	2.0	35.984	p19	CB 3P Gnd
Circuit Breaker	PDF Machine & Converters			2	08	2	.692	p19	1.324	.5	1.5	.5	2.5	3.46	Est	CB 3P Gnd
Motor Starter	BIF Activating Motor			10	08	2	1.015	p33	10.15	.5	1.0	.5	2.0	2.26	p33	Relay Contactor Gnd
20 amp Terminator				10	08	2	.3	*	3	.5	1.0	.5	2.0	4.0	Est	
Overload MTR				20	08	2	.692	p19	13.04	.5	1.0	.5	2.0	27.68	Est	CB 3P Gnd
Fuse, 150A				10	08	2	.1	*	1	.5	1.0	.5	2.0	2	Est	
MCC-D IN ENCL. TRANS. Bldg																
Circuit Breaker	5 100A			26	09	2	.692	p19	17992	.5	1.0	.5	2.0	35.984	p19	CB 3P Gnd
Circuit Breaker	> 100A			1	09	2	.692	p19	.692	.5	1.5	.5	2.5	1.73	Est	CB 3P Gnd
Control Transformer				8	09	2	.3	*	2.4	.5	1.0	.5	2.0	4.8	Est	
Motor Starter				6	09	2	1.015	p33	6.104	.5	1.0	.5	2.0	16.20	p33	Relay Contactor Gnd
Overload MTR				16	09	2	.692	p19	11.072	.5	1.0	.5	2.0	22.144	Est	CB 3P Gnd
Fuse, 150A				8	09	2	.1	*	.8	.5	1.0	.5	2.0	1.6	Est	

$$ENA = 92.46 \times 10^{-6} / HR \quad ENATM = 172.05 \times 10^{-6}$$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure

$$MTBF = \frac{1}{ENA} = \frac{1}{92.46 \times 10^{-6}} = 10815 \text{ HRS} \quad MTR = \frac{ENATM}{ENA} = \frac{172.05 \times 10^{-6}}{92.46 \times 10^{-6}} = 1.86 \text{ HRS}$$

$$AVAILABILITY = \frac{1}{1 + MTR} \times 100\% = \frac{1}{1 + 1.86} \times 100\% = 34.8\%$$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA					REMARKS		
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE λ (X10 <sup>-6</sup> /HR)	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL MAINT. TIME TM (X10 <sup>-6</sup> ) (HR)		NA TM (X10 <sup>-6</sup> )	SOURCE (*)
Circuit Breakers Circuit Breakers Motor Starters Control Transformers	MCC-E 120/200V 60/100A > 100A			14	10	2	.692	p19	9.600	.5	1.0	.5	2.0	19.376	p19	CB 3P Gnd
				2	10	2	.692	p19	1.354	.5	1.5	.5	2.5	3.46	EST	CB 3P Gnd
				8	10	2	1.013	p33	6.104	.5	1.0	.5	2.0	16.208	p33	Relay Control Gnd
				16	10	2	.3	X	4.0	.5	1.0	.5	2.0	9.6	EST	CB 3P Gnd
Overload HRC Fuses	MCC-F in POF Bldg > 100A			16	10	2	.692	p19	11.072	.5	1.0	.5	2.0	22.144	EST	CB 3P Gnd
				8	10	2	.1	X	.8	.5	1.0	.5	2.0	1.6	EST	CB 3P Gnd
				21	11	2	.692	p19	14.512	.5	1.0	.5	2.0	25.064	p19	CB 3P Gnd
				1	11	2	.692	p19	.692	.5	1.5	.5	2.5	1.78	EST	CB 3P Gnd
Overload HRC Fuses	MCC-F in POF Bldg > 100A			6	11	2	1.013	p33	6.078	.5	1.0	.5	2.0	12.152	p33	Relay Control Gnd
				6	11	2	.3	X	1.8	.5	1.0	.5	2.0	3.6	EST	CB 3P Gnd
				12	11	2	.692	p19	8.704	.5	1.0	.5	2.0	16.448	EST	CB 3P Gnd
				6	11	2	.1	X	.6	.5	1.0	.5	2.0	1.2	EST	CB 3P Gnd

ENA =  $67.284 \times 10^{-6}$  /HR

MTBF =  $\frac{1}{ENA}$  = 1 \_\_\_\_\_ HRS

MTTR =  $\frac{INATM}{ENA}$  = \_\_\_\_\_ HRS

AVAILABILITY =  $\frac{1}{1 + \frac{MTTR}{MTBF}} \times 100\%$  = \_\_\_\_\_ %

\*Information is detailed in Supplemental Data Sheet

\*\*Failure sequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Does Not Affect Maintenance Record

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK 427 ELECTRICAL (ELE)

DESCRIPTION					FAILURE DATA					MAINTAINABILITY DATA					REMARKS	
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ. (**)	RATE $\lambda \times 10^{-6}/\text{HR}$	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)	TOTAL PAINT TIME TM (HR)	NA TM (X10 <sup>-6</sup> )		SOURCE (*)
Circuit Breakers	LIGHTING PANEL BOARD ≤ 100A PANELS A1, 2, 3 & 4			98	(01)	2	.612	p19	62.52	.5	1.0	.5	2.0	137.06	p19	C13 3P Gnd
Circuit Breakers	≤ 100A PANELS A5, 6, 8, 1			62	12	2	.692	p19	42.904	.5	1.0	.5	2.0	85.334	p19	C13 3P Gnd
Circuit Breakers	≤ 100A PANELS C1, 2 & 3			56	14	2	.692	p19	38.732	.5	1.0	.5	2.0	72.504	p19	C13 3P Gnd
Circuit Breakers	≤ 100A PANELS E1, 2, 3 & 4			69	15	2	.672	p19	47.788	.5	1.0	.5	2.0	95.976	p19	C13 3P Gnd
Circuit Breakers	≤ 100A PANELS D1, F1			34	16	2	.692	p19	23.320	.5	1.0	.5	2.0	47.032	p19	C13 3P Gnd
202	480V DISTRIBUTION				(01)											
Circuit Breakers	40-200A			17	24	2	.692	p19	11.764	.5	1.0	.5	2.0	23.326	p19	C13 3P Gnd
Emergency Transfer Sw	/			1	24	2	1.013	p33	1.013	.5	2.0	.5	3.0	3.031	p33	Relay Control Gnd
Ground Fault Relay				1	24	2	.166	p33	.166	.5	1.0	.5	2.0	.332	p33	General Gnd

$$\text{ENATM} = \frac{462.278 \times 10^{-6}}{10.4148 \times 10^{-6}} = 44.38 \text{ HRS}$$

$$\text{MTTR} = \frac{20.31496}{50.946} = 2.023 \text{ HRS}$$

$$\text{MTBF} = \frac{1}{\text{ENATM}} = \frac{1}{44.38} = 2.253 \times 10^{-2} \text{ HRS}$$

$$\text{MTTR} = \frac{1}{\text{MTTR}} = \frac{1}{2.023} = 0.494 \text{ HRS}$$

$$\text{AVAILABILITY} = \frac{1}{1 + \text{MTTR} \times 100\%} = 99.79\%$$

\* Information is detailed in Supplemental Data Sheet  
 \*\* Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #30 CLOSED CIRCUIT TV (CTV)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	14.155	8760	228.31	2.0	.25
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	Y	7	7	7	



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #30 CLOSED CIRCUIT TV (CTV)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	114.155	8760	228.31	2.0	.99
Tank, Spray, TMU-28/B	VX	None	None	1	1	1	1	1
Ton Container	GB	None	None	1	1	1	1	1
Tone Container	VX	None	None	1	1	1	1	1
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	1	1	1	1	1

SUPPLEMENTAL DATA

BUILDING BLOCK

#30 CTV

11-12-75 RWA

A. DESCRIPTION

1. SOURCE

- a. DRAWING NO. See ATTACHED List DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES The performance of this Building Block is judged to be  
unaffected by prod. 'in rates.

B. FAILURE DATA

1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER Ben Carter - Denver Mfg. Rep. for Cylindrical eqpt.  
(303)-623-6447

2. NOTES No written data available - Experience reported at Building  
on 30 systems indicates < 1 failure/year/system - Best estimate is one  
failure per year with system shutdown.

C. MAINTENANCE DATA

1. ESTIMATE SOURCE

- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

D. GENERAL REMARKS

Failure of items listed will not automatically cause a  
production line shutdown. The items can be replaced or  
repaired during normal production activities. See above  
for basis of failure rate assignment.

AD-A062 401

TRW/ENVIRONMENTAL ENGINEERING DIV REDONDO BEACH CA  
RELIABILITY AND MAINTENANCE PROGRAM ANALYSIS RELIABILITY AND MA--ETC(U)  
APR 76

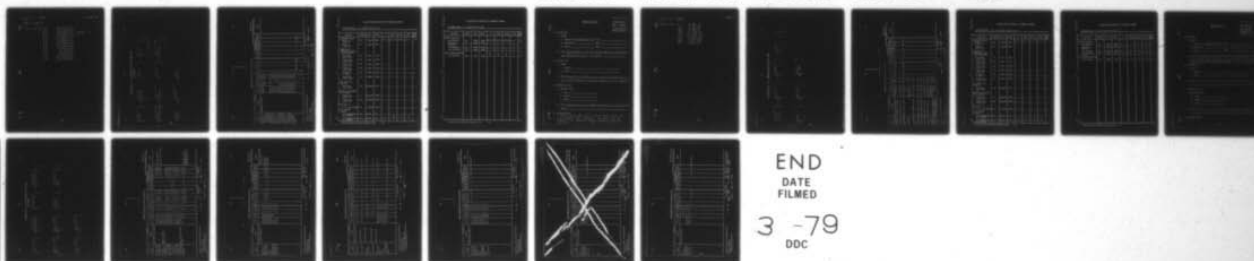
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DAAG49-75-C-0135

UNCLASSIFIED

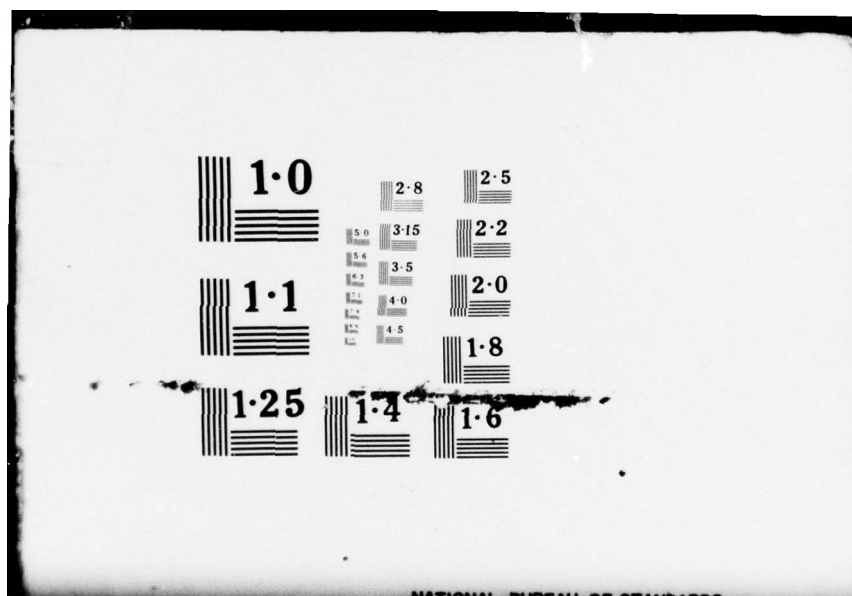
DRCPM-DR-D-CR-76009-VOL-2 NL

4 OF 4  
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DDC



NATIONAL BUREAU OF STANDARDS

BB #30 CTU

11-12-75 RW

Drawings:

8

30-503-01

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26 JUN 75

28 FEB 75

19 MAR 75 REV 1

12 DEC 74

11 DEC 74

19 DEC 74

21 JAN 75

25 JAN 75

1 JUL 75

5/24/75

5/24/75

24 FEB 75

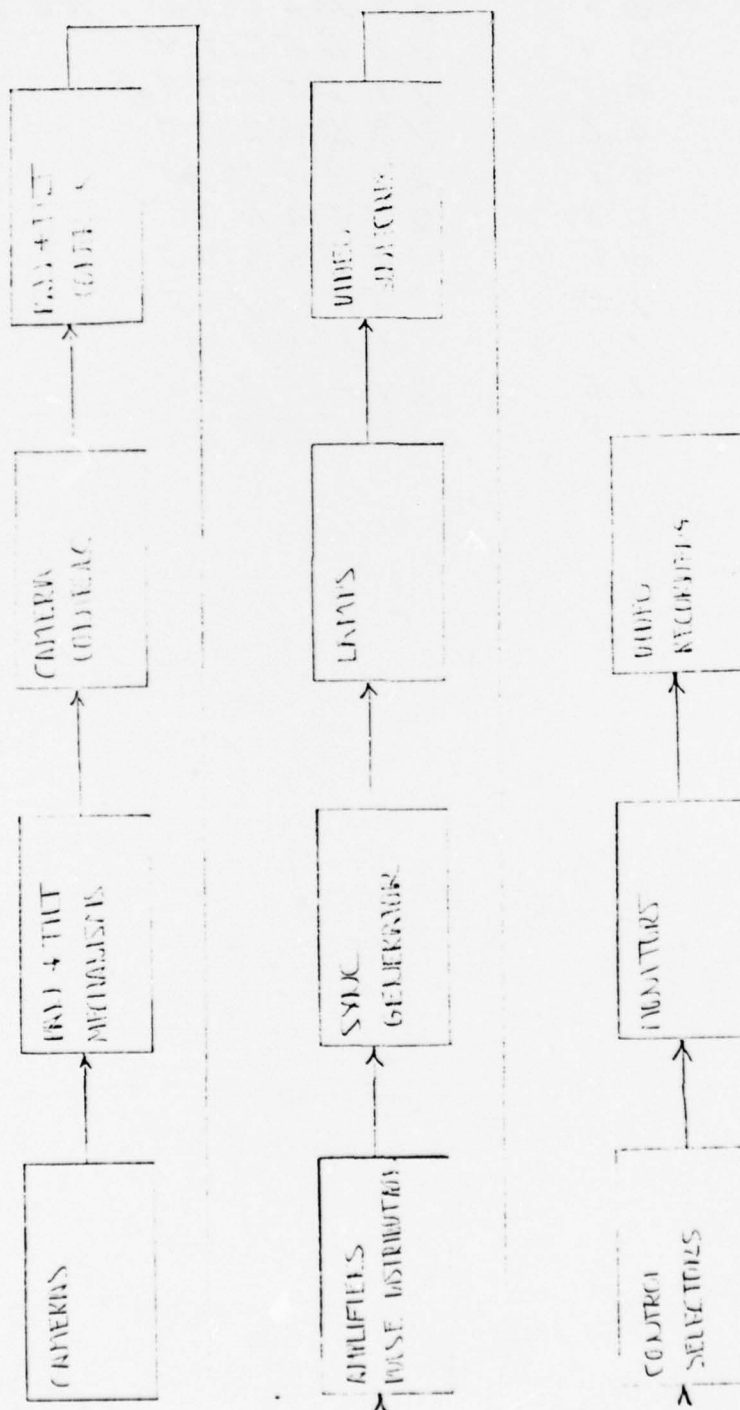
24 FEB 75

2

3



BUILDING BLOCK: #30 CLOSED CIRCUIT TELEVISION (CTV)  
FLOW CHART



EQUIPMENT INFORMATION AND FAILURE MAINTAINABILITY DATA

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS					
ITEM NAME	FUNCTION	PART NO.	MSG CODE NO.	QTY (N)	UNIT SOURCE (*)	EST. CASH (**)	DATE (X10 <sup>-6</sup> )	SOURCE (*)	HA	DIAGN. TIME (HR)	REPAIR TIME (HR)		CHECK-OUT TIME (HR)	TOTAL MAINT TIME (HR)	N.A. TH (X10 <sup>-6</sup> )	SOURCE (*)	
CAMERA, TV Pan & Tilt Cannon Camera w/ Video Rec, P.S. Unit No. 2, Base Gen Camera, Pan/Tilt Video, Base Data Generator, Slave Monitor 9" w/ Monitor 23" w/ 2 1/4" Video Cannon 1400 Cannon Head TV Cannon Head Video Hi Temp Pan & Tilt Cannon Camera Camera, Sea Master Camera, Sea Slave Monitor, Video Switch, Video SYSTEM	SURVEILLANCE FACILITY	2006-001	05157	8	0301	3											
		17350-MA	11044	3	0302	3											
			05157	2	0314	3											
		2481-001	05157	2	0716	3											
		9000-162		3	0318	3											
		3780-400		1	0320	3											
		72737		10	0321	3											
		72737		2	0323	3											
		2008-350-00		2	0322	3											
		2006-012	05157	2	0301	3											
2006-005	05157	7	0302	3													
2006-012	05157	1	0303	3													
EX-7529	05157		0304	3													
PT-150 MA	12644	2	0305	3													
3761-911	05157	4	0306	3													
EX-7722A	05157	1	0308	3													
EX-7722B	05157	1	0309	3													
14C-700	24641	2	0711	3													
VS 122A	11650	2	0312	3													
		1		2	11/4/55		11/4/55						2	228.310	60		

$MIBF = \frac{1}{ENR} = \frac{1}{114.157 \times 10^{-6}} = 8760 \text{ HRS}$ 
 $MTR = \frac{ENR}{ENR} = \frac{2.28310}{114.157} = 2.0 \text{ HRS}$ 
 $ENR = 228.310 \times 10^{-6}$ 
 $AVAILABILITY = 1 - MTR \times 100\% = 99.97\%$

\*Information is detailed in Supplemental Data Sheet  
 \*\*\*Failure Consequence Code  
 1 - Catastrophic Failure  
 2 - Production Line Shutdown Failure

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #31 COMMUNICATIONS (CGM)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	365.296	2737.51	1095.88	3.0	.99
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	7	7	7	7	

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #31 COMMUNICATIONS (CCM)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	365.396	2737.51	1095.889	3.0	.996
Tank, Spray, TMU-28/B	VX	None	None					
Ton Container	GB	None	None					
Tone Container	VX	None	None					
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	7	7	7	7	7



SUPPLEMENTAL DATA

BUILDING BLOCK

#31 Corr.

11/12/55 RMA

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. SEE ATTACHED LIST DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES The performance of this Building Block is judged to be unaffected by prod. lot rates.

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER \_\_\_\_\_

2. NOTES Assumed one (1) failure in 5 years requiring processing shutdown due to failure of exchange. Assumed one (1) failure in one year from shipment.

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER \_\_\_\_\_

2. NOTES Assumed time to completely replace exchange with substitute unit.

## D. GENERAL REMARKS

Failure of the items listed will not automatically cause a production line shutdown. The items can be replaced or repaired during normal production activities.

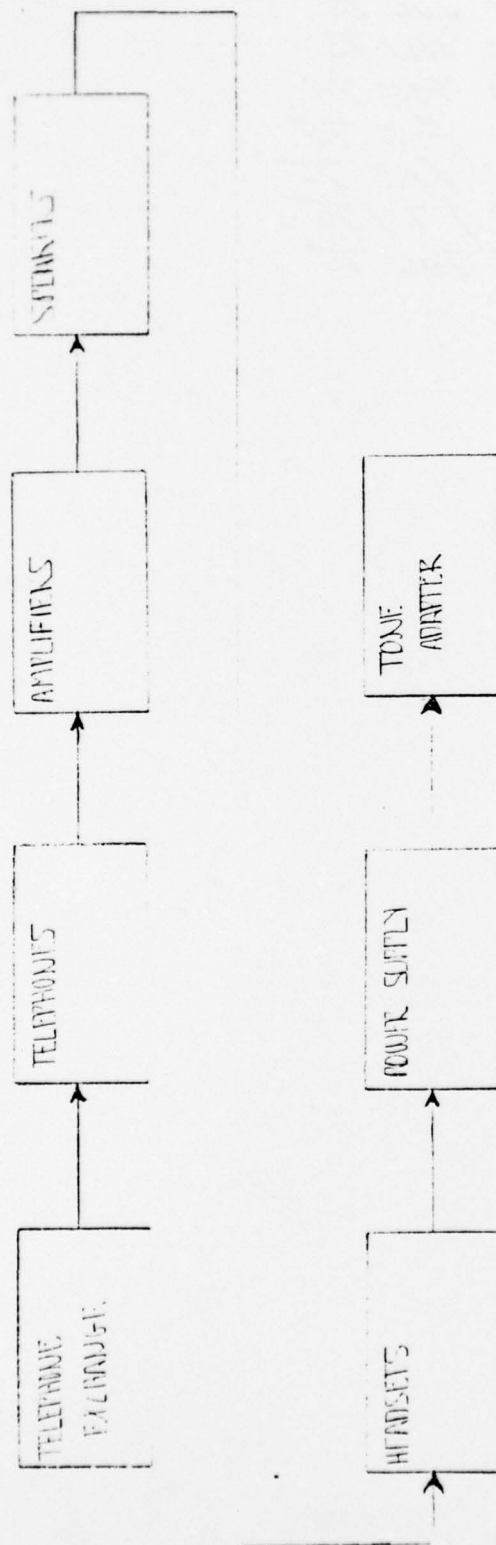


1513 - 31 Dues

11/12/75

31 - 502 - 01	4 AUG 75
02	7 JUL 75
31	12 NOV 73
41	19 FEB 74
05	10 FEB 75
07	11 APR 75
08	7 / 7 / 75
09	7 JUL 75

BUILDING BLOCK: #31 COMMUNICATIONS (COM) FLOW CHART



EQUIPMENT INFORMATION AND FAILURE MAINTAINABILITY DATA

ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
					1. FREQ. SOURCE (1)	2. FREQ. SOURCE (2)	3. FREQ. SOURCE (3)	4. FREQ. SOURCE (4)	5. REPAIR TIME (HR)	6. CHECK-OUT TIME (HR)	7. TOTAL REPAIR TIME (HR)	8. MATH (X10 <sup>-6</sup> )	
SPARE ENCL. AUTOMATIC	CENTRAL SWITCHING AC INTERCOM SYSTEM	AKD860	2187	1	0.01	22.371	*	22.371	2	3	18	40.23	*
more, PB Data Intercom Stations		K-3554	34267	40	0.142								
more, PB Data Intercom Stations		LT-2000	22574	3	0.107	114.135	*	114.135	1.5	1.5	2.0	62.93	Est
more, PB Data Intercom Stations		AKD741	8260	1	0.119								
more, PB Data Intercom Stations		F10-7	9014	10	0.104								
more, PB Data Intercom Stations		C18-7	8771	15	0.105								
more, PB Data Intercom Stations		R2-8	8771	22	0.106								
more, PB Data Intercom Stations		114840	82572	10	0.107								
more, PB Data Intercom Stations		AKD860	2187	1	0.115								
more, PB Data Intercom Stations		LS1-1105	82478	3	0.504								
more, PB Data Intercom Stations		82572		3	0.505								
more, PB Data Intercom Stations				3	0.7								

$MTBF = \frac{365.256 \times 10^6}{365.256 \times 10^6} = 1.0$   
 $MTR = \frac{109.124}{365.256} = 0.299$   
 $MTTM = \frac{109.124}{365.256} = 0.299$   
 $MTBF \times 100 = 100 \times 1.0 = 100$   
 $MTTR \times 100 = 100 \times 0.299 = 29.9$

\* Information is detailed in Supplemental Data Sheet  
 \* Failure Cause Code  
 1 - Catastrophic Failure  
 2 - Probable Failure  
 3 - Potential Failure

# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #35 SITE CONTROL SYSTEM (SCS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*M55 ROCKET, GB/VX Rocket, 115mm, M55	GB	Comp B	M28	2787.87	358.7	5478.74	2.14	.75
Rocket, 115mm, M55	VX	Comp B	M28					
*PROJECTILES/ CARTRIDGES, GB/VX WITHOUT BURSTERS								
Cartridge, 105mm, M360	GB	None	None					
Projectile, 155mm, M121A1	GB	None	None					
Projectile, 155mm, M121	GB	None	None					
Projectile, 155mm, M122	GB	None	None					
Projectile, 8", M426	GB	None	None					
Projectile, 155mm, M121A1	VX	None	None					
*P/C, GB/VX WITH BURSTERS								
Cartridge, 105mm, M360	GB	Tetrytol	M1					
*PROJECTILES, MUSTARD WITH BURSTERS								
Projectile, 155mm, M110	H	Tetrytol	None					
Projectile, 155mm, M104	HD	Tetrytol	None					
*M23 MINE, VX								
Mine, 2 gallon, M23	VX	Comp B	None					
*4.2" MORTAR, MUSTARD								
Cartridge, Mortar, 4.2", M2/M2A1	HD	Tetryl	M6					
Cartridge, Mortar, 4.2", M2/M2A1	HT	Tetryl	M6	7	7	7	7	



# BUILDING BLOCK AVAILABILITY PARAMETER SUMMARY

BUILDING BLOCK: #35 SITE CONTROL SYSTEM (SCS)

MUNITION	AGENT	EXP.	PROP.	Nλ	MTBF	NλTM	MTTR	AVAIL ABIL
*BULK ITEMS, GB/VX								
Bomb, 750#, MC-1	GB	None	None	—	—	—	—	—
Tank, Spray, TMU-28/B	VX	None	None	—	—	—	—	—
Ton Container	GB	None	None	—	—	—	—	—
Tone Container	VX	None	None	—	—	—	—	—
<i>NK94</i>								
*TON CONTAINER, MUSTARD								
Ton Container	HD	None	None	—	—	—	—	—



SUPPLEMENTAL DATA

BUILDING BLOCK:

# 35 SITE CONT

SYSTEM (SCS)

11/11/5 RSC

## A. DESCRIPTION

## 1. SOURCE

- a. DRAWING NO. See Attached List DATE: \_\_\_\_\_
- b. DOCUMENT NO. \_\_\_\_\_ DATE: \_\_\_\_\_
- c. OTHER \_\_\_\_\_ DATE: \_\_\_\_\_

2. NOTES The performance of this Building Block is judged to be unaffected by production rates. The few components affected by production rates contribute to the total availability analysis in a minor way.

## B. FAILURE DATA

## 1. SOURCE

- a. CUSTOMER \_\_\_\_\_
- b. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

## C. MAINTENANCE DATA

## 1. ESTIMATE SOURCE

- a. RMA \_\_\_\_\_
- b. TEAD/EA \_\_\_\_\_
- c. OTHER \_\_\_\_\_

2. NOTES \_\_\_\_\_

## D. GENERAL REMARKS

11/14/75 Lwr.

BUILDING BLOCK: #35 SITE CONTROL SYSTEM (SCS)

DRAWINGS:  
35-204

APR 75

35-504-01

13 AUG 74 REV 2

02

7 AUG 74 REV 2

03

4 OCT 74 REV 3

04

13 AUG 74 REV 2

05

30 JUL 74 REV 1

06

20 JUN 74

07

25 JUN 74

08

12 SEP 74 REV 1

09

24 OCT 74 REV 3

10

2 JUL 75

11

22 JUL 75

12

22 JUL 75

13

22 JUL 75

14

13 SEP 74 REV 1

15

7 JUN 75

16

3 JUL 75

17

9 MAY 75

18

10 SEP 74

19

15 JAN 75 REV 1

20

6 JUN 75

21

26 JUL 75

22

10 FEB 75 REV 1

23

12 NOV 74

24

24 FEB 75

25

2 MAR 75

26

4 MAR 75

27

18 FEB 75

30

31 MAY 75

31

9 JUN 75

32

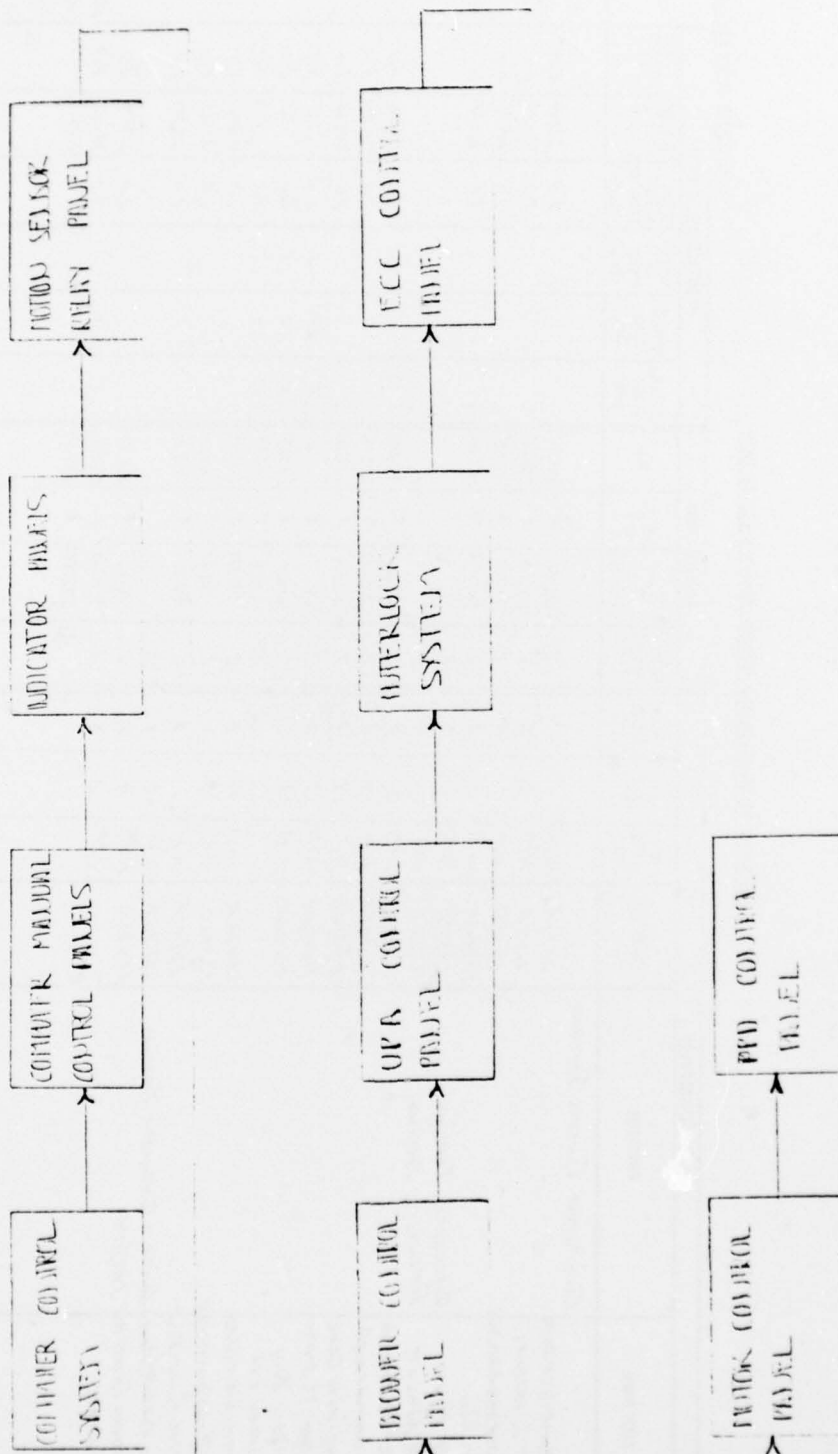
6 JUN 75

- SOURCE OF EQUIPMENT DESCRIPTION AND FAILURE R. & HEWLETT PACKARD - S NELSON - RADC Notebook II
- INTEGRATED CIRCUIT FAILURE RATE  
MIL STD 217A p 7.14-6  $(.4 \times 10^{-6})$
- RESISTOR FAILURE RATE  
MIL STD 217A p 7.13-1 METAL GLASS  $(.0063 \times 10^{-6})$
- REPAIR TIME FOR COMPUTER CONTROL SYSTEM  
INCLUDES TIME TO REPAIR BY 'CARD' SUBSTITUTION  
OR CHANGE TO SECONDARY UNIT (i.e. DUAL DISC)
- NA FOR CONDITIONS WHERE TWO UNITS ARE IN  
OPERATION AND ONLY ONE IS REQUIRED FOR  
CONTINUED PRODUCTION:

$$N \lambda_{\text{effective}} = 1 \times \lambda \times \frac{2}{3}$$

REFERENCE: RELIABILITY THEORY AND PRACTICE  
JACOB BAZOUSKI 1961

# BUILDING BLOCK: #35 SITE CONTROL SYSTEM (SCS) FLOW CHART



EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

DESCRIPTION				FAILURE DATA				MAINTAINABILITY DATA				REMARKS				
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (S)	INFO. REF. (S)	DATE (X10 <sup>-6</sup> HR)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	NATH (X10 <sup>-6</sup> )	SOURCE (*)	
Computer-32K MEM	Computer Control System	2100A	HIP	1	*	2	414.42	*	414.42			2.0	828.84	ESR	REFER TO NOTES RE N2 One Unit used for production	
CRT Terminal		2415A	HIP	2	*	2	240.369	*	245.367			2.0	492.738	ESR		
Multi-Processor		6940A	HIP	1	*	2	113.986	*	113.986			2.0	227.972	ESR		
Dial Disc		12960A	HIP	2	*	2	463.466	*	463.466			2.0	927.932	ESR		
TAPE READER	DIAGNOSTIC TESTING	2995A	HIP	1	*	3									REFER TO NOTES re N2 Printer FRI - assumed to be from (1) hours disc. <input type="checkbox"/>	
TAPE READER	DIAGNOSTIC TESTING	2748A	HIP	1	*	3										
Multi-Proc. Expander		6941A	HIP	2	*	2	476.19	*	95.233			2.0	170.476	ESR		
ITE output CARD		69331A	HIP	18	*	2	20.122	*	362.746			2.0	724.742	ESR		
Event Sense CARD		69434A	HIP	3	(204)	2	57.100	*	171.305			2.0	342.604	ESR	REFER TO NOTES re N2 Printer FRI - assumed to be from (1) hours disc. <input type="checkbox"/>	
32 bit IC SWN		318-3AE	02015	3	23	2	.4	*	1.2	.5	.5	2.0	2.4	ESR		
10000 14W		CB 2045	50119	12	23	2	.0463	*	.0752	.5	.5	2.0	.1572	ESR		
10000 14W		69420A	HIP	12	23	2	.0463	*	.0752	.5	.5	2.0	.1572	ESR		
Isolation Input CARD		12939C	HIP	18	*	2	212.975	*	404.549			2.0	808.098	ESR	REFER TO NOTES re N2 Printer FRI - assumed to be from (1) hours disc. <input type="checkbox"/>	
Time Base Generator		12939C	HIP	1	*	2	74.31	*	74.31			2.0	14.822	ESR		
Isolation Input Card		12901A	HIP	1	*	2	99.21	*	99.21			2.0	19.842	ESR		
TAPE READER/PRINTER	DIAGNOSTIC TESTING	12597A	HIP	2	*	3		*				2.0	212.304	ESR		
TELETYPE UNIT		12531C	HIP	4	*	2	24.665	*	49.44	.5	2.0	.5	3.0	55.22	ESR	REFER TO NOTES re N2 Printer FRI - assumed to be from (1) hours disc. <input type="checkbox"/>
PRINTER			HIP	2	*	2	323.755	*	323.755			10.0	10.0	ESR		

INA 70255.233 10<sup>-6</sup>  
5792.0444

INA 7270.482 10<sup>-6</sup> /HRS  
2727.3551

MTBF =  $\frac{1}{\text{INA}}$  = 1 MTR =  $\frac{1}{\text{MTR}}$  x 100% = 100%  
MTR =  $\frac{1}{\text{MTR}}$  = 1 MTR =  $\frac{1}{\text{MTR}}$  x 100% = 100%

\* Information is detailed in Supplemental Data Sheet

\*\* Failure Source Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

3 - Minor Failure - Does Not Affect Production



## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #35 SITE CONTROL SYSTEM (SCS)

DESCRIPTION					FAILURE DATA				MAINTAINABILITY DATA				REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL. CONSEQ. (**)	RATE A (X10 <sup>-6</sup> )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL TIME (HR)	N A TM (X10 <sup>-6</sup> )	SOURCE (*)
	COMPUTER MAINFRAME CONTROL # INDICATOR PANELS			4	(504)											Quantities shown for single set of panels
Toggle Switches		117W91-402	91929	40	0102	3	1.329	P37	1.329	.5	10	.5	40	5.316	P37	(2603 Gnd)
Key Switch		PTK-42351491929		1	0103	2	.166	P33	.664	.5				20	1.320	P33
Relay 48 Pole		801-424-115	14195	4	0104	2	.166	P33						20		(5202 Gnd)
Relay 48 Pole		801-424-115	14195	1	0114	2	.166	P33	.166	.5	10	.5	20	.372	P33	(5202 Gnd)
Bulbs		NE-51-1120	72619	3	0107	3										
Bulbs		502-7A-F40	26031	40	0110	3										
12B. Switch Mainframe		85A01	26031	1	0111	3										
Power Supply 250 VA		50 A 23		1	0113	3										
1110R 33K ~		50A23375		40	0117	3										
30 1500R 330 ~		50A 402125		1	0118	3										
302																

$$\begin{aligned} \text{INATM} &= 6.976 \times 10^{-6} \\ \text{XY} &= 22.304 \times 10^{-6} \\ \text{ENATM} &= \frac{\text{INATM}}{\text{ENATM}} \times 100\% = \frac{6.976}{22.304} \times 100\% = 31.3\% \end{aligned}$$

$$\begin{aligned} \text{MTBF} &= \frac{1}{\text{ENATM}} \times 10^6 \text{ HRS} \\ \text{MTTR} &= \frac{1}{\text{ENATM}} \times 100\% \end{aligned}$$

Information is detailed in Supplemental Data Sheet

Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK 33 523 1/1-1

ITEM NO.	ITEM NAME	FUNCTION	FAILURE DATA				MAINTAINABILITY DATA				REMARKS
			QTY	INFO. SOURCE	FAIL. CONSEQ.	RATE	NA	DIAGN. TIME	REPAIR TIME	CHECK-OUT TIME	
			(N)	(*)	(*)	(10 <sup>-6</sup> /HR)	(*)	(HR)	(HR)	(HR)	
30	301	Motor Servo Keyway Panel	1	304	2	.166	332	.5	1.0	.5	(Item 6nd)
31	311	Source Control Panel	1	312	2	.133	20.714	.5	1.1	.5	(Item 6nd)
32	321	UIA Control Panel	1	322	2	.270	1.08	.5	1.0	.5	(Item 6nd)
33	331	Motor Control Panel	1	332	2	.133	20.714	.5	1.1	.5	(Item 6nd)
34	341	Interlock System	1	342	2	.133	1.187	.5	1.0	.5	(Item 6nd)
35	351	Light	1	352	2	.166	.166	.5	1.0	.5	(Item 6nd)
36	361	Light	1	362	2	.166	.166	.5	1.0	.5	(Item 6nd)
37	371	Light	1	372	2	.166	.166	.5	1.0	.5	(Item 6nd)
38	381	Light	1	382	2	.166	.166	.5	1.0	.5	(Item 6nd)
39	391	Light	1	392	2	.166	.166	.5	1.0	.5	(Item 6nd)
40	401	Light	1	402	2	.166	.166	.5	1.0	.5	(Item 6nd)
41	411	Light	1	412	2	.166	.166	.5	1.0	.5	(Item 6nd)
42	421	Light	1	422	2	.166	.166	.5	1.0	.5	(Item 6nd)
43	431	Light	1	432	2	.166	.166	.5	1.0	.5	(Item 6nd)
44	441	Light	1	442	2	.166	.166	.5	1.0	.5	(Item 6nd)
45	451	Light	1	452	2	.166	.166	.5	1.0	.5	(Item 6nd)
46	461	Light	1	462	2	.166	.166	.5	1.0	.5	(Item 6nd)
47	471	Light	1	472	2	.166	.166	.5	1.0	.5	(Item 6nd)
48	481	Light	1	482	2	.166	.166	.5	1.0	.5	(Item 6nd)
49	491	Light	1	492	2	.166	.166	.5	1.0	.5	(Item 6nd)
50	501	Light	1	502	2	.166	.166	.5	1.0	.5	(Item 6nd)
51	511	Light	1	512	2	.166	.166	.5	1.0	.5	(Item 6nd)
52	521	Light	1	522	2	.166	.166	.5	1.0	.5	(Item 6nd)
53	531	Light	1	532	2	.166	.166	.5	1.0	.5	(Item 6nd)
54	541	Light	1	542	2	.166	.166	.5	1.0	.5	(Item 6nd)
55	551	Light	1	552	2	.166	.166	.5	1.0	.5	(Item 6nd)
56	561	Light	1	562	2	.166	.166	.5	1.0	.5	(Item 6nd)
57	571	Light	1	572	2	.166	.166	.5	1.0	.5	(Item 6nd)
58	581	Light	1	582	2	.166	.166	.5	1.0	.5	(Item 6nd)
59	591	Light	1	592	2	.166	.166	.5	1.0	.5	(Item 6nd)
60	601	Light	1	602	2	.166	.166	.5	1.0	.5	(Item 6nd)
61	611	Light	1	612	2	.166	.166	.5	1.0	.5	(Item 6nd)
62	621	Light	1	622	2	.166	.166	.5	1.0	.5	(Item 6nd)
63	631	Light	1	632	2	.166	.166	.5	1.0	.5	(Item 6nd)
64	641	Light	1	642	2	.166	.166	.5	1.0	.5	(Item 6nd)
65	651	Light	1	652	2	.166	.166	.5	1.0	.5	(Item 6nd)
66	661	Light	1	662	2	.166	.166	.5	1.0	.5	(Item 6nd)
67	671	Light	1	672	2	.166	.166	.5	1.0	.5	(Item 6nd)
68	681	Light	1	682	2	.166	.166	.5	1.0	.5	(Item 6nd)
69	691	Light	1	692	2	.166	.166	.5	1.0	.5	(Item 6nd)
70	701	Light	1	702	2	.166	.166	.5	1.0	.5	(Item 6nd)
71	711	Light	1	712	2	.166	.166	.5	1.0	.5	(Item 6nd)
72	721	Light	1	722	2	.166	.166	.5	1.0	.5	(Item 6nd)
73	731	Light	1	732	2	.166	.166	.5	1.0	.5	(Item 6nd)
74	741	Light	1	742	2	.166	.166	.5	1.0	.5	(Item 6nd)
75	751	Light	1	752	2	.166	.166	.5	1.0	.5	(Item 6nd)
76	761	Light	1	762	2	.166	.166	.5	1.0	.5	(Item 6nd)
77	771	Light	1	772	2	.166	.166	.5	1.0	.5	(Item 6nd)
78	781	Light	1	782	2	.166	.166	.5	1.0	.5	(Item 6nd)
79	791	Light	1	792	2	.166	.166	.5	1.0	.5	(Item 6nd)
80	801	Light	1	802	2	.166	.166	.5	1.0	.5	(Item 6nd)
81	811	Light	1	812	2	.166	.166	.5	1.0	.5	(Item 6nd)
82	821	Light	1	822	2	.166	.166	.5	1.0	.5	(Item 6nd)
83	831	Light	1	832	2	.166	.166	.5	1.0	.5	(Item 6nd)
84	841	Light	1	842	2	.166	.166	.5	1.0	.5	(Item 6nd)
85	851	Light	1	852	2	.166	.166	.5	1.0	.5	(Item 6nd)
86	861	Light	1	862	2	.166	.166	.5	1.0	.5	(Item 6nd)
87	871	Light	1	872	2	.166	.166	.5	1.0	.5	(Item 6nd)
88	881	Light	1	882	2	.166	.166	.5	1.0	.5	(Item 6nd)
89	891	Light	1	892	2	.166	.166	.5	1.0	.5	(Item 6nd)
90	901	Light	1	902	2	.166	.166	.5	1.0	.5	(Item 6nd)
91	911	Light	1	912	2	.166	.166	.5	1.0	.5	(Item 6nd)
92	921	Light	1	922	2	.166	.166	.5	1.0	.5	(Item 6nd)
93	931	Light	1	932	2	.166	.166	.5	1.0	.5	(Item 6nd)
94	941	Light	1	942	2	.166	.166	.5	1.0	.5	(Item 6nd)
95	951	Light	1	952	2	.166	.166	.5	1.0	.5	(Item 6nd)
96	961	Light	1	962	2	.166	.166	.5	1.0	.5	(Item 6nd)
97	971	Light	1	972	2	.166	.166	.5	1.0	.5	(Item 6nd)
98	981	Light	1	982	2	.166	.166	.5	1.0	.5	(Item 6nd)
99	991	Light	1	992	2	.166	.166	.5	1.0	.5	(Item 6nd)
100	1001	Light	1	1002	2	.166	.166	.5	1.0	.5	(Item 6nd)

ENATM =  $47.222 \times 10^{-6}$  /HR

\*Information is detailed in Supplemental Data Sheet

Failure Consequence Code

- 1 - Catastrophic Failure
- 2 - Production Line Shutdown Failure
- 3 - Minor Failure - Repair During Maintenance Period
- 4 - See Supplemental Data Sheet

MTBF =  $\frac{1}{ENATM}$  = 1 /  $47.222 \times 10^{-6}$  = 21175 HRS

MTTR =  $\frac{ENATM}{ENATM}$  = 1 / 1 = 1 HRS

AVAILABILITY =  $\frac{MTBF}{1 + MTBF}$  =  $\frac{21175}{1 + 21175} = 99.995\%$

EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

BUILDING BLOCK #35 SITE CONTROL SYSTEM (SCS)

DESCRIPTION					FAILURE DATA			MAINTAINABILITY DATA					REMARKS			
ITEM NAME	FUNCTION	PART NO.	MFG CODE NO.	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE $\lambda$ ( $\times 10^{-6}/\text{HR}$ )	SOURCE (*)	NA	DIAGN. TIME (HR)	REPAIR TIME (HR)	CHECK-OUT TIME (HR)		TOTAL MAINT TIME TM ( $\times 10^{-6}$ )	SOURCE (*)	
Switch, Rotary	PPD CONTROL PANEL	3511-7	82121	1	1304	2	1329	p33	1.329	1.0	1.5	1.5	4.0	5.316	p33	(Rotary End)
P.B. Switch Unit		4111 310104	91929	1	2005	3										
P.B. Switch Unit		4111 310104	91929	1	2007	3										
P.B. Switch Unit		4111 310104	91929	1	2008	3										
P.B. Switch Unit		4111 310104	91929	1	2009	3										
Light		4111 310104	91929	1	2010	3										
Light		4111 310104	91929	1	2011	3										
Switch Section		4111 310104	91929	1	2012	3										
Switch Section		4111 310104	91929	1	2013	3										
Light		4111 310104	91929	1	2014	3										
Light		4111 310104	91929	1	2015	3										
304		4111 310104	91929	1	2016	3										

$\text{ENA} = 1.329 \times 10^{-6} / \text{HR}$   
 $\text{MTBF} = \frac{1}{\text{ENA}} = \frac{1}{1.329 \times 10^{-6}} = 752,446 \text{ HRS}$   
 $\text{MTTR} = \frac{\text{ENATM}}{\text{ENA}} = \frac{5.316 \times 10^{-6}}{1.329 \times 10^{-6}} = 4.0 \text{ HRS}$   
 $\text{AVAILABILITY} = \frac{1}{1 + \text{MTTR} \times 100\%} = \frac{1}{1 + 4.0 \times 100\%} = 0.2 \text{ (20\%)}$

\*Information is detailed in Supplemental Data Sheet

\*\*Failure Consequence Code

1 - Catastrophic Failure

2 - Production Line Shutdown Failure

BLOCK #35 SITE CONTROL SYSTEM (SCS)

## EQUIPMENT INFORMATION AND FAILURE/MAINTAINABILITY DATA

ITEM NAME	DESCRIPTION	FAILURE DATA						MAINTENANCE DATA				REMARKS		
		PART NO.	MFG CODE	QTY (N)	INFO. SOURCE (*)	FAIL CONSEQ (**)	RATE A ( $\times 10^{-6}$ /HR)	SOURCE (*)	DIAGN. TIME (HR)	REPAIR TIME (HR)	TOTAL MAINT TIME TM (X10-6) (HR)		N.A.T.M	SOURCE (*)
SWITCH INDICATOR Vibrac Releaser Rover Supply Co FUSE 1A SWITCH KEY	ECC CONTROL PANEL				(SDH) 624-5	3								
		SR72-100-117		1										
		SDM-5												
		JA 4100						p37 A327			XO	S-816	p37	(Relay Grid)

305

2107  
2442 NRS  
WORK IN  
1008 ECC

$$\begin{array}{r} 4-6-8-12 \\ 7-11-13-14 \\ 15-16-17-18 \\ \hline 9-10-11-12 \end{array}$$

INA =  $1.329 \times 10^{-6}$  /IR  
~~5470412~~ 2787.8723 ✓  
 = 2322.2 HRS  
 358.70  
 358.70  
 MTT

Information is detailed in Supplemental Data Sheet

9/19/90 Sequence Code

Catastrophic Failure  
Production Line Shutdown Failure

$$\text{AVAILABILITY} = \frac{1}{\text{MTR}} \times 100\% = 72.95\%$$



## BUILDING BLOCK #35 SITE CONTROL SYSTEM (SCS)

[illegible]

• Information is detailed in Supplemental Data Sheet

Sequence Code

1 - Catastrophic Failure  
2 - Production Line Shutdown Failure

$$\begin{aligned} \text{ENIATM} &= 5316 \times 10^{-6} \\ \lambda_{\text{ENIATM}}^3 &= 15.948 \lambda_{\text{ENIATM}}^{-6} \\ \lambda_{\text{ENIATM}}^3 &= 15.948 \lambda_{\text{ENIATM}}^{-6} \\ \lambda_{\text{ENIATM}}^3 &= 15.948 \lambda_{\text{ENIATM}}^{-6} \\ \lambda_{\text{ENIATM}}^3 &= 15.948 \lambda_{\text{ENIATM}}^{-6} \end{aligned}$$

$$\text{AVAILABILITY} = \frac{1}{\text{MTTR}} \times 100\% = \frac{1}{2.9563} \times 100\% = 33.82\%$$



